

A r a n a G u l c h W a t e r s h e d E n h a n c e m e n t P l a n

Initial Study and Mitigated Negative Declaration

PREPARED FOR
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MITIGATED NEGATIVE DECLARATION

DATE: June 28, 2002

PROJECT: Arana Gulch Watershed Enhancement Plan

LOCATION: Arana Gulch watershed, located partially within the City of Santa Cruz and partially within the unincorporated portion of Santa Cruz County

LEAD AGENCY: Santa Cruz County Resource Conservation District

PROJECT DESCRIPTION: The project consists of adoption and subsequent implementation of the *Arana Gulch Watershed Enhancement Plan*. The Plan objectives are to improve, protect and increase accessibility to and use of steelhead habitat throughout Arana Gulch and to reduce erosion and sedimentation of public and private property throughout the watershed. The Plan identifies projects to be implemented that respond to identified problems related to channel bank instabilities, accelerated hillside erosion, and fish barriers. The Plan also sets forth recommendations for ongoing monitoring and long-term management considerations.

FINDINGS: The Santa Cruz County Resource Conservation District has reviewed the proposed project and has determined that the project, based on the analyses contained in the Initial Study, will not have a significant effect on the environment with implementation of mitigation measures. An Environmental Impact Report is not required pursuant to the California Environmental Quality Act of 1970. The environmental review process and Mitigated Negative Declaration have been completed in accordance with the California State Public Resources Code and the California Environmental Quality Act (CEQA) State Guidelines, as amended to date.

BASIS OF FINDINGS: The following mitigation measures will be incorporated into the project design or as construction specifications or implemented as Best Management Practices, to ensure that any potentially significant environmental impacts will be avoided, minimized or reduced to a less-than-significant level.

1. Some projects that involve removal of culverts or other channel modifications may be required to dewater the site for construction and could have indirect impacts upon steelhead. This potential exists for proposed Projects #1 (Blue Trail Dam), #7 (Culvert beneath Paul Sweet Road), #12 (Fish Barrier-Driveway Culvert), and #16 (Lower Delaveaga Park Gully). Projects that will require dewatering will need to be implemented in a manner that maintains flows and prevents erosion. Although indirect impacts are not considered significant due to the limited area of disturbance and the likely short-term duration of the planned construction activities, any potential effect upon the habitat of a federally listed species would be considered potentially significant. Any work in the creek channel also will require approval of a Streambed Alteration Agreement by the California Department of Fish and Game (CDFG). Such an agreement has already been approved for Project #12.

MITIGATION MEASURE 1: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of the Initial Study for further discussion of BMPs) to

require that any future repairs or work in the channel be conducted outside steelhead migration period and that the use of coffer dams and dewatering be implemented to maintain bypass flows and prevent erosion.

2. Implementation of future repair projects would result in potential disruption of nesting birds, if they are present, due to tree removal, which may occur in a limited amount for Project #2 or where equipment noise and construction activity could affect nesting birds (particularly raptors) in trees adjacent to the retaining wall construction zones (i.e., Project #3). Most of the proposed activities would be done without use of heavy equipment. However, any tree removal and/or construction within riparian areas should be conducted outside the breeding season.

MITIGATION MEASURE 2: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of the Initial Study for further discussion of BMPs) to require that if construction, including tree removal, is scheduled to begin between March and late July, a pre-construction nesting survey will be conducted by a qualified wildlife biologist to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors are found, construction may need to be delayed until late-August, or after the wildlife biologist has determined the nest is no longer in use.

3. Implementation of the proposed site-specific projects could result in minor amounts of erosion if not properly controlled. However, most of the projects are small in scale and likely will not involve heavy equipment, except for regrading at Project site #14, which would involve grading and importation of fill on an approximate 1-acre site. If not properly managed, grading could result in localized erosion. Implementation of erosion control measures will ensure that construction materials and/or sediments are not inadvertently released into the channel during future repair activities. Though repairs at most sites will not involve heavy equipment, Best Management Practices should be implemented to prohibit equipment or maintenance of equipment in the channel in order to protect water quality.

MITIGATION MEASURE 3: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of the Initial Study for further discussion of BMPs) to control erosion and require that all construction materials and fill be stored and contained in a designated area that is located away from channel areas to prevent inadvertent transport of materials into the adjacent stream channel. Prohibit fueling, cleaning or maintenance of equipment except in designated areas located as far from the creek as possible. As a precaution, require contractor to maintain adequate materials onsite for containment and clean-up of any spills.

Comments on the Mitigation Negative Declaration and Initial Study should be submitted in writing to Karen Christensen at the Santa Cruz County Resource Conservation District, 820 Bay Avenue, Suite 107, Capitola, CA 95010, between July 3, 2002 and August 1, 2002. The Mitigated Negative Declaration is tentatively scheduled for adoption by the Santa Cruz County Resource Conservation District Board of Directors on August 14, 2002.

For more information or to request a copy of the Initial Study, contact Bobbie Haver at (831) 457-8132. A copy of the Initial Study also is available for public inspection at the Santa Cruz County Resource Conservation District, at the address above, by calling 831-464-2950 to arrange a time when someone will be in the office.

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SECTION 1. INTRODUCTION

PURPOSE OF THE INITIAL STUDY

This Initial Study (IS) has been prepared by the Santa Cruz County Resource Conservation District (RCD), the lead agency for the project. The RCD is responsible for adoption of the proposed *Arana Gulch Watershed Enhancement Plan* and subsequent implementation of site-specific projects within the watershed in coordination with the Arana Gulch Watershed Alliance (AGWA).

The IS has been prepared pursuant to the California Environmental Quality Act (CEQA). The purposes of an IS are to:

1. Provide the Lead Agency with information to use as the basis for deciding whether to prepare an Environmental Impact Report (EIR) or a Negative Declaration (ND).
2. Enable a Lead Agency to modify a project, mitigating adverse impacts before an EIR is prepared, thereby enabling the project to qualify for a ND.
3. Assist in the preparation of an EIR, if one is required.
4. Facilitate environmental assessment early in the design of a project.
5. Provide documentation of the factual basis for the finding in a ND that a project will not have a significant effect on the environment.
6. Eliminate unnecessary EIRs.
7. Determine whether a previously prepared EIR could be used with the project. [Per CEQA Guidelines Section 15063(c)]:

According to CEQA Guidelines Section 15070, a public agency shall prepare a Negative Declaration or a Mitigated Negative Declaration when:

1. The IS shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or
2. The IS identifies potentially significant effects, but:
 - a. Revisions in the project plans made before a proposed Mitigated ND and IS are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur, and
 - b. There is no substantial evidence, in light of the whole record before the agency, that the project as described may have a significant effect on the environment.

PROJECT BACKGROUND

In 1994, Friends of the Arana Greenbelt formed, focused on promoting open space and biodiversity. In 1996, the Coastal Watershed Council initiated a Volunteer Water Monitoring Program in Arana Gulch. The joint efforts of the Santa Cruz Port District, USDA Natural Resources Conservation Service, and the Santa Cruz County Resources Conservation District led to the Coordinated Resources Management and Planning (CRMP) Program for the Arana Gulch Watershed. Through a series of public meetings from 1996 to 1998, a list of community issues and resource concerns were generated and a watershed steering committee established.

The Arana Gulch Watershed Alliance (AGWA) subsequently formed. AGWA's mission is "to conserve, protect, restore and enhance the natural resources throughout the Arana Gulch Watershed." In order to realize this mission, AGWA has adopted a list of goals that include:

- To improve water quality and riparian habitat along the Arana Creek for fish and wildlife,
- To enlist community support and involvement, both private and public, for the conservation of Arana's natural resources, and
- To provide for long-term management and viability of the project.

The proposed Enhancement Plan was prepared under the direction of AGWA. Field work for this plan was conducted from late 1998 through mid-2001, and included fishery reviews conducted by Don Alley and sediment assessments conducted by Balance Hydrologics. The California Coastal Conservancy (CC) and the California Department of Fish and Game (DFG) funded this project.

PROJECT OVERVIEW

The project consists of adoption and subsequent implementation of the *Arana Gulch Watershed Enhancement Plan*. The Plan objectives are to improve, protect and increase accessibility to and use of steelhead habitat throughout Arana Gulch and to reduce erosion and sedimentation of public and private property throughout the watershed. The Plan identifies projects to be implemented that respond to identified problems related to channel bank instabilities, accelerated hillside erosion; and fish barriers. The Plan also sets forth recommendations for ongoing monitoring and long-term management considerations. A full description is presented in SECTION 2—PROJECT DESCRIPTION.

REGULATORY REQUIREMENTS

The RCD is the lead agency responsible for adopting the Plan and implementing specific repair or enhancement projects, with the exception of projects on City land, for which the City would be the lead agency. Implementation of site-specific projects will require consent of the property owner, development of engineered plans, potential approval of local permits, and in some cases additional environmental review when site-specific plans are developed. The following agencies have or may have permit or review authority over the proposed project.

- County of Santa Cruz – Approval of future coastal permit and/or grading or other permits for specific implementation projects

- City of Santa Cruz – Approval of future coastal permit and/or grading permit for specific implementation projects
- California Department of Fish and Game – Approval of Streambed Alteration Agreement for future specific implementation projects
- California Coastal Conservancy – Approval of funding for implementation
- U.S. Army Corps of Engineers – Potential approval of nationwide permits for work in stream channel with potential consultation with U.S. Fish and Wildlife Service and National Marine Fisheries

REPORT ORGANIZATION

Section 2.0 describes the project location, environmental setting, and elements of the proposed project. **Section 3.0** is the Environmental Checklist. **Section 4.0** evaluates the impacts of the proposed project. **Section 5.0** presents a mitigation monitoring program for mitigation measures identified in this document. **Section 6.0** lists references, persons contacted, and persons who contributed to preparation of this document.

SECTION 2. PROJECT DESCRIPTION

PROJECT LOCATION AND ENVIRONMENTAL SETTING

Arana Gulch is located within in the unincorporated portion of Santa Cruz County and the City of Santa Cruz. It begins in the hills above Chaminade and flows through the Santa Cruz Yacht Harbor into the Monterey Bay, which is a federally designated national marine sanctuary. The last segment flows through the eastern limits of the City of Santa Cruz. See Figure 1.

The Arana Gulch watershed drains a 3.5 square-mile area between the City and County of Santa Cruz. The basin is relatively long and narrow with elevations ranging from sea level at the harbor to over 600 feet at the northern boundary in the upper watershed. Three steep-walled drainage systems, with sustained slopes of up to 70%, occupy the northern portion of the watershed: the eastern branch, the central branch and the western branch. These branches have carved valleys in the Purisima sandstone in the headwaters and come together upstream of the Oak Meadow Cemetery to form the main branch of Arana Gulch. The main stem flows along a flat-floored alluvial valley between steep walls cut into the staircase of marine terraces on which most of Santa Cruz has been built.

Mean annual precipitation can range from approximately 26 inches per year along the coast to 34 inches per year near the headwaters of Arana Gulch. Most of the rain in Arana Gulch and Santa Cruz County falls during the months of November to March.

Principal land uses in the Arana watershed are urban, primarily residential, commercial and light industrial, plus institutional areas such as schools, hospitals and cemeteries. Much of the upper basin remains in large holdings, with sparse rural residential development; this part of the watershed is covered by forests and brushlands, with some grasslands and orchards. Land use within the watershed has changed significantly in recent years. Residential and institutional uses have increasingly displaced grasslands and orchards, especially in the lower watershed.

PROJECT DESCRIPTION

Project Purpose and Need

Arana Gulch is one of the smaller streams on the Central Coast of California, which has historically sustained steelhead spawning and rearing. Currently, available salmonid habitat in the watershed is poor in quality due to a number of limiting factors, including sedimentation. The purposes of the project were to (a) conduct an assessment of current sediment and salmonid fisheries conditions and (b) to recommend restoration projects to repair individual sites or constraints in the Arana Gulch Watershed. The purposes of the studies include:

- Identifying problems in the watershed related to erosion and bed sedimentation and their related effects on salmonid habitat,
- Developing an understanding of the causes of these and other current problems,

- Preparing conceptual plans to manage and repair identified problems, generally at specific sites,
- Providing strategies to implement conceptual repairs and management programs, and
- Suggesting a monitoring plan for use in long-term adaptive management.

The Enhancement Plan also aimed at anticipating and addressing conditions, which could develop in the watershed as a result of episodic events or from the expansion of existing problems to new portions of the watershed. Finally, the Plan seeks to assess the health of the watershed and plan for long-term 30- to 50-year potential conditions.

Project Objectives

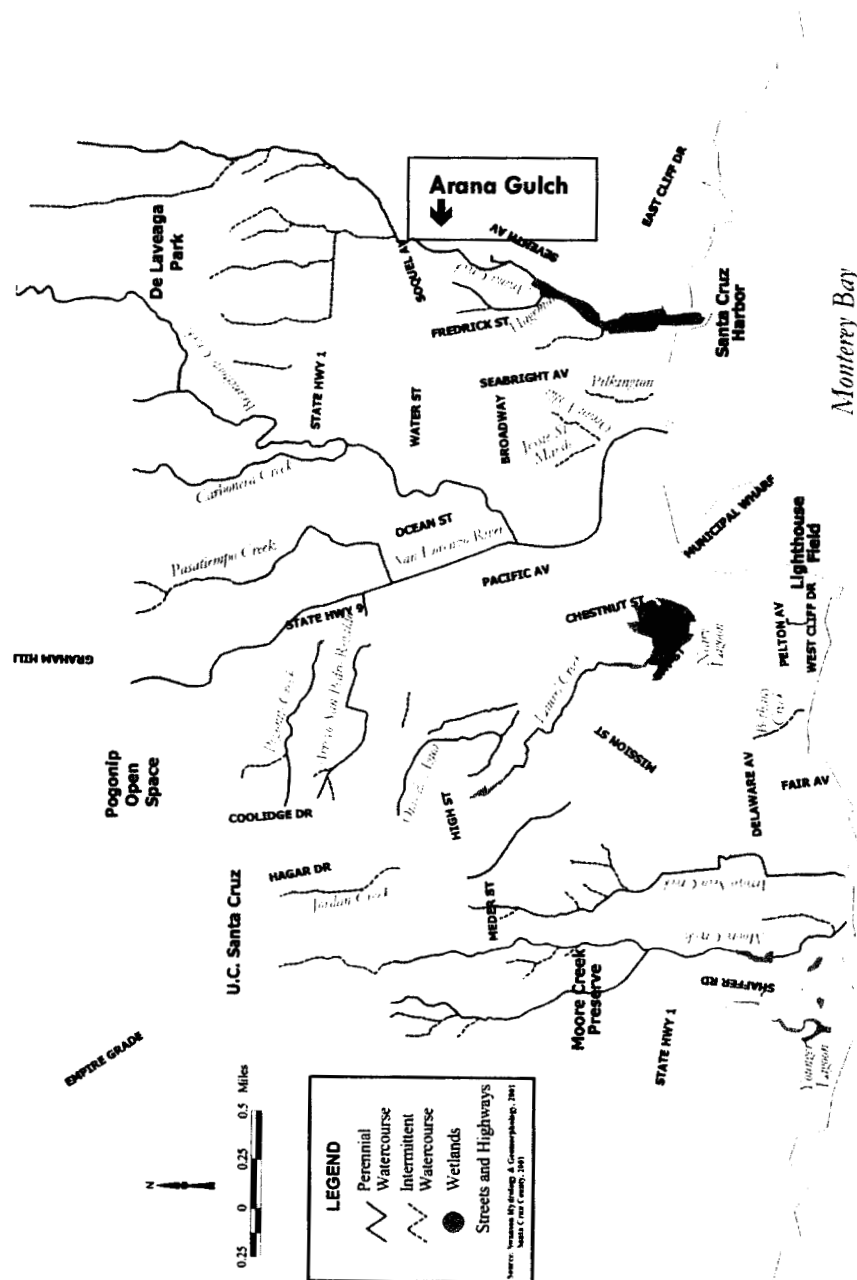
The proposed Watershed Enhancement Plan was developed with the following objectives:

1. To improve, protect and increase accessibility to and use of steelhead habitat throughout Arana Gulch. It is hoped that this can be accomplished by:
 - Decreasing the volume of sandy sediment that reaches the stream annually,
 - Decreasing the volume of sandy sediment that is deposited on the streambed,
 - Improving passage conditions through barriers,
 - Allowing sufficient large woody debris to remain in the channel, and
 - Restoring the riparian corridor in reaches near the High School fish ladder and the Brookwood Drive stream crossing
2. To reduce erosion of public and private property throughout the watershed.
3. To reduce sedimentation of public and private property throughout the watershed.

Project Characteristics

The proposed Watershed Enhancement Plan recognizes three distinct areas of effort: implementation of repair and restoration plans, monitoring of implemented repairs and adaptive management to those repairs if negative conditions arise, and preparing for issues which may arise in the next 50 years or beyond. Implementation of suggested repair plans is laid out over 10 years through 3 phases of implementation. Monitoring and adaptive management of repairs should continue indefinitely following implementation. The Plan indicates that it may take three to five decades for some measures to fully take effect, or to fill gaps in knowledge or resources needed to set the stage for the next plan.

FIGURE 1: PROJECT LOCATION



SOURCE: BIOTIC RESOURCES GROUP, FINAL DRAFT CITY-WIDE CREEKS AND WETLANDS MANAGEMENT PLAN, CITY OF SANTA CRUZ, APRIL 2002

Proposed Repair Projects

The Plan identifies 21 major sediment sources and steelhead migrational barriers currently located in the Arana Gulch watershed. Mapped sources of sediment in the watershed range in total volumes lost from 8 to 9000 cubic yards, and steelhead migrational barriers were found on the main stem, the central branch and the eastern branch. The Enhancement Plan recommends specific repair and monitoring programs to address these concerns including:

- Site specific repair and stabilization of point and non-point sources of sediment,
- Removal of steelhead migrational barriers,
- Enhanced removal of sandy sediment from the sedimented channels through small-scale sediment basins and off-channel storage surfaces,
- Monitoring of identified areas prone to gullying, landscaping and other erosional problems, and
- Monitoring of summer baseflows and their water quality to establish a stronger understanding of long-term baseflow characteristics.

Table 1 at the end of this section presents a priority listing of specific projects, and locations are shown on Figure 2. Further descriptions, conceptual plans and photos for each repair site are included in Appendix B. The conceptual repairs were designed to be site specific and, where appropriate, to reflect commonly used erosion control practices. The listed projects respond to the following identified problems in Arana Gulch:

- Channel Bank Instabilities (Sites 1, 2 and 19);
- Accelerated Erosion of Hillsopes (Sites 3, 11, 13, 14, 15, 16, and 18); and
- Fish Barriers (Sites 4, 5, 6, 7, 8, 9, 10).

Most of the proposed projects are intended to reduce delivery of sand and other sediments to Arana Gulch, its tributaries, and to the harbor. The remaining projects are mostly directed at providing passage for upmigrating adult steelhead to the eastern and central branches, where low flows in late summer are greatest, and where the best steelhead habitat was identified. The Plan recommendations are for general planning purposes only, to phase and fund work in a logical progression. Further analysis, design, environmental review, and permits will follow on a site-specific basis. Monitoring plans have also been suggested to observe the success and failure of implemented repairs and to aid further tracking of changes in the watershed.

Sediment Basins

Small-scale sedimentation basins are proposed for Arana Gulch, when and where willing owners are prepared to incorporate them in future plans. Sedimentation basins have been identified as a viable and effective solution due to the nature of sediment that is produced and transported through Arana Gulch. Sand-sized sediment is the dominant class produced and transported through Arana Gulch. Sediment basins and off-channel storage basins are an effective means of removing sand sized particles from the water column and from deposition in vital steelhead habitat.

One basin, originally constructed in the 1970s, has been put back into operation through a cooperative effort of AGWA, the School District, Department of Fish and Game, and the Public Works Departments of both the County and City of Santa Cruz. The basin has already been cleaned out once of its capacity of about 400 cubic yards of material that has been recycled to projects of these two agencies where sand fill is needed. Up to three or four basins of approximately the same size are recommended on the west branch, the Chaminade tributary, and the main stem (see Figure 3). Modification of an existing borrow pit to create an off-line basin just south of Highway 1 is also under consideration.

The proposed sedimentation basins are all located in the upper watershed and above the Brookwood Drive crossing. Several criteria were developed to aid identification of candidate locations:

- The basins should be located downstream of the identified sediment sources to effectively reduce the volume of sediment transported to the lower watershed,
- The basins should be accessible from established roads to facilitate construction and maintenance,
- Basin locations should minimize flood potential to upstream and downstream residents, and
- Where possible, basins should be located in reaches that present additional over-bank storage area with the potential for development of seasonal wetlands.

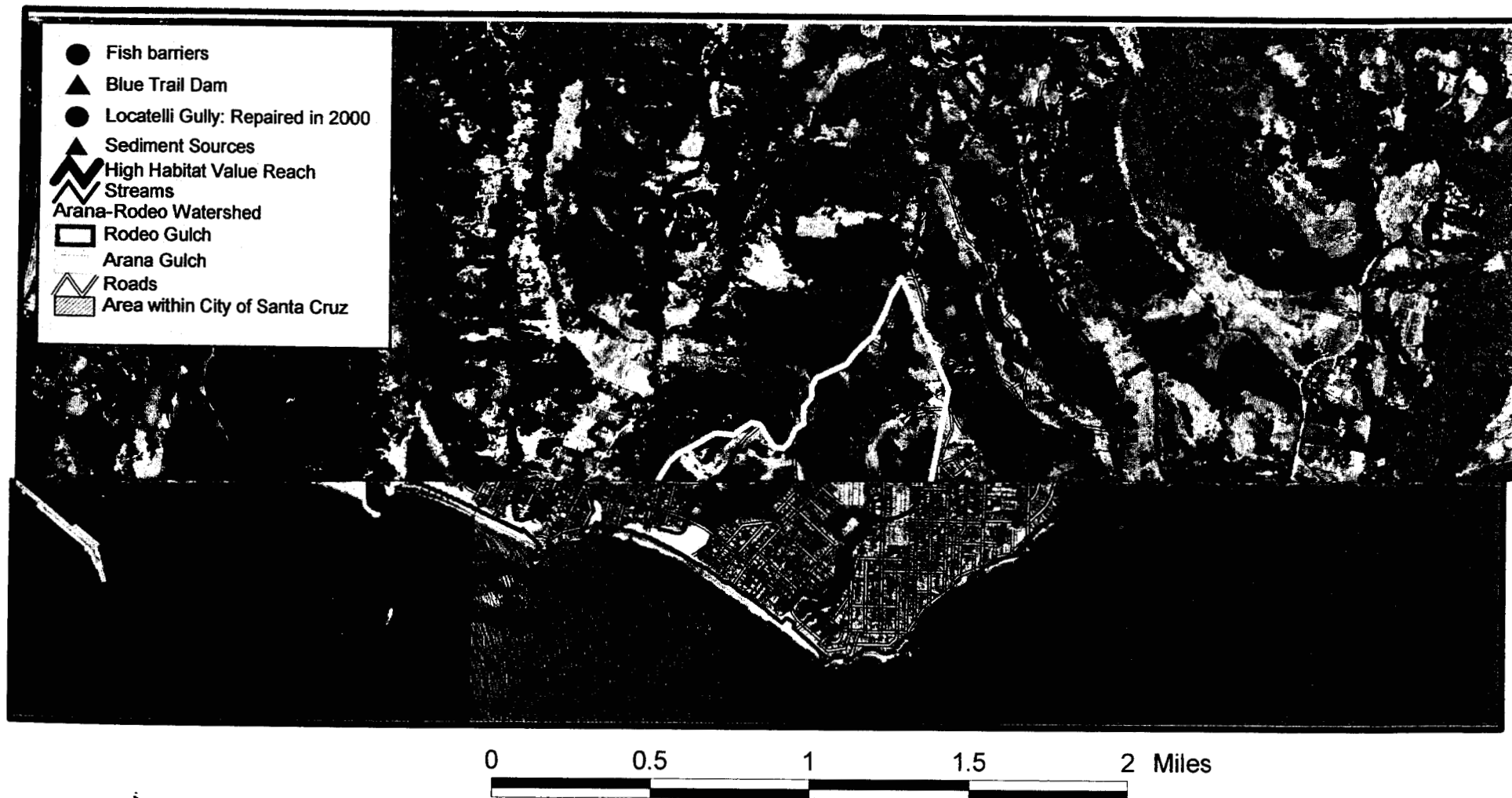
The sedimentation basins are planned to be sized to store roughly 300 cubic yards of material. This corresponds to a total reduction of 1500 cubic yards in the volume of material transported from the upper watershed to the lower reaches. This volume is more than the median for annual sand transport. Depending on how often the basins were mechanically or naturally cleaned out, a reduction of 1500 cubic yards is a significant step towards achieving decreased downstream sedimentation and enhanced fish habitat. Further analysis, design, environmental review, and permits for sediment basins will be provided in the future as the basins are planned and designed.

Implementation

Implementation of conceptual repairs are proposed within implementation phases:

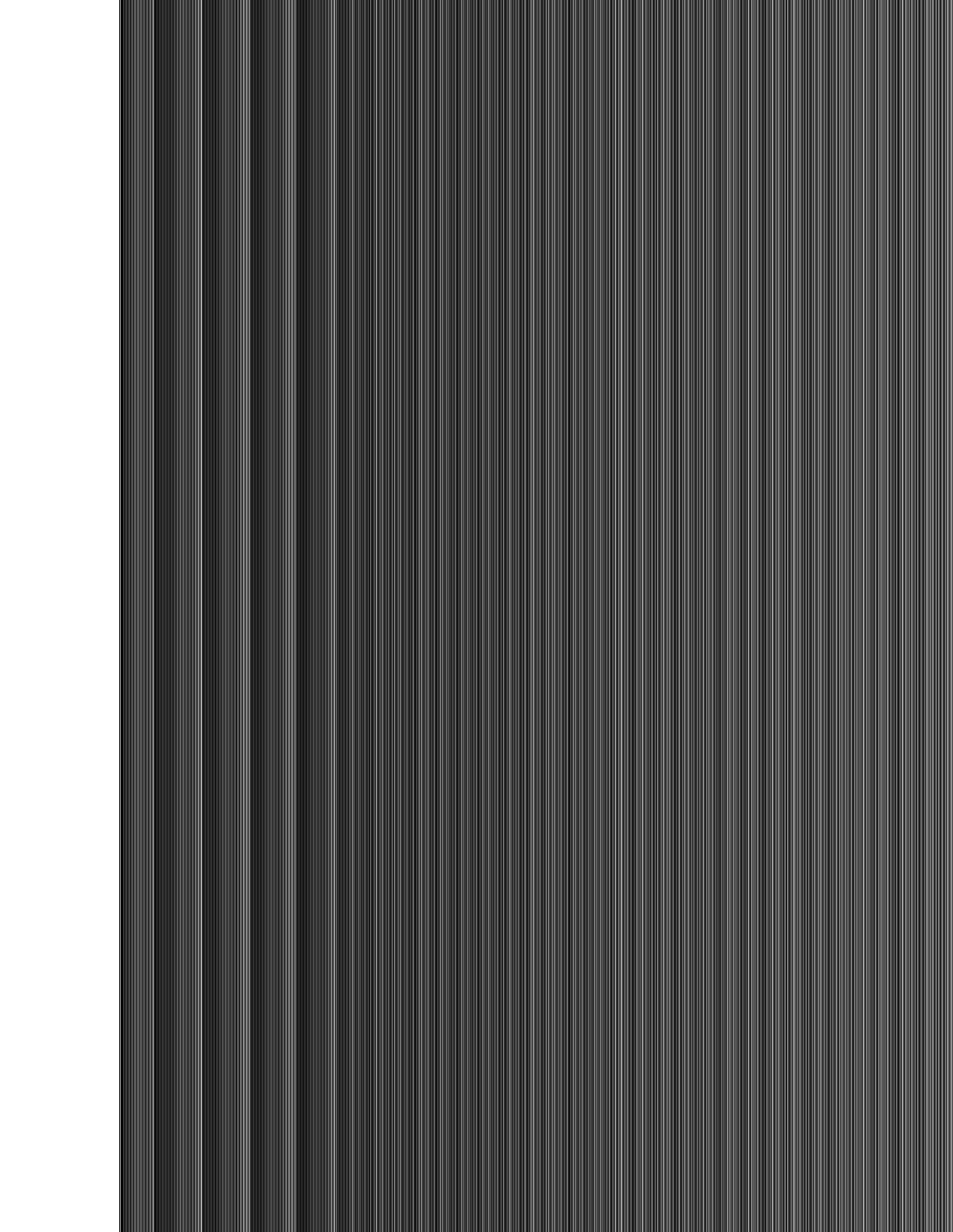
- Phase 1: 1-3 years
- Phase 2: 3-5 years, and
- Phase 3: 5-7 years.

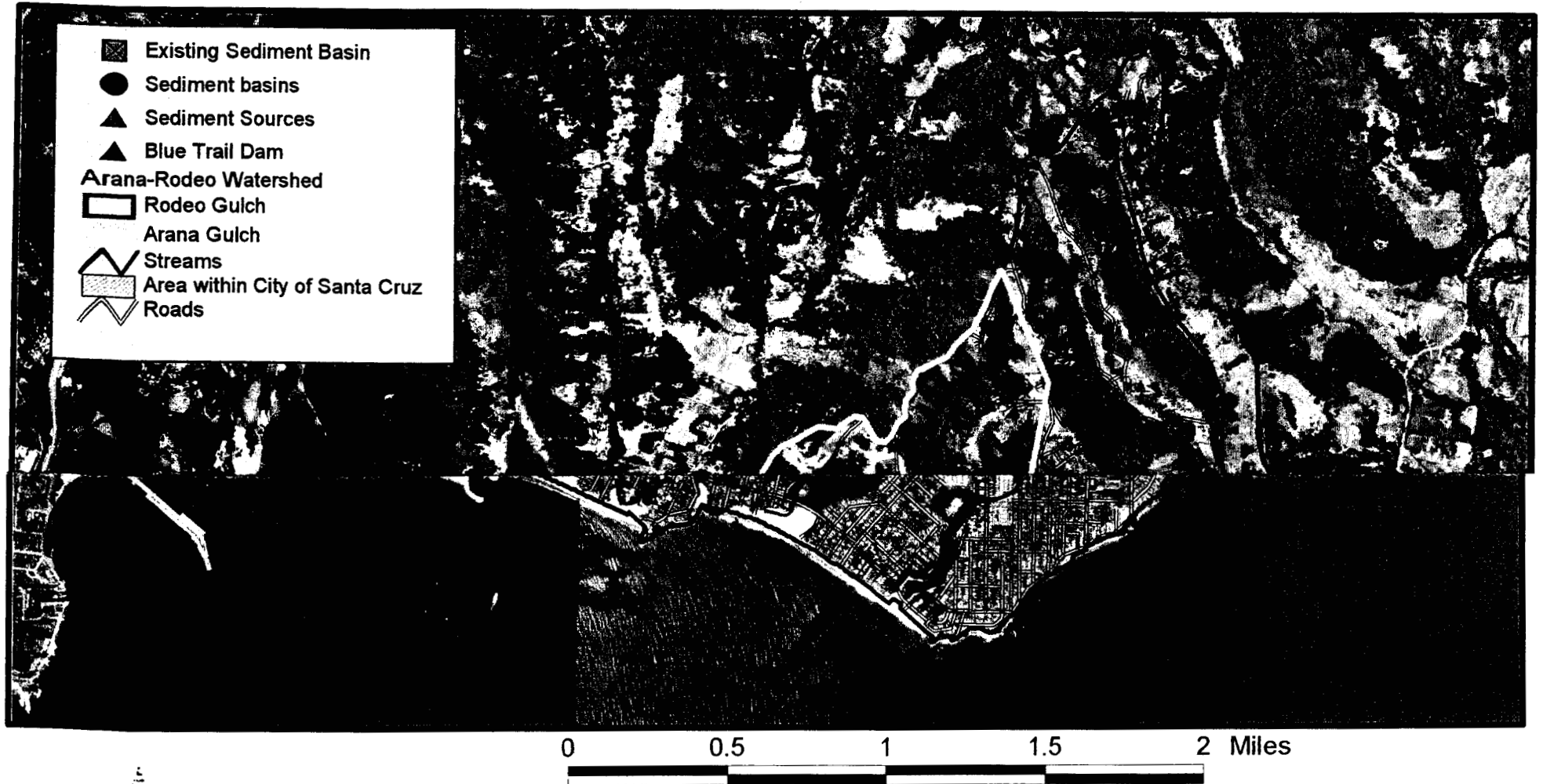
Once repair plans have been implemented, the suggested monitoring program will provide a means to measure relative success or failure and will provide valuable data about the changing conditions in the watershed. This systematic and comprehensive plan for implementing and monitoring repairs will provide a science-based rationale to use when applying for funds, will increase the opportunity for funding of future repairs because of forward momentum, and can build support among residents of the watershed and among others interested in or charged with its repair.



Balance
Hydrologics, Inc.

FIGURE 2: LOCATIONS OF RECOMMENDED PROJECTS





Balance
Hydrologics, Inc.

FIGURE 3: RECOMMENDED SEDIMENT BASIN LOCATIONS

Monitoring and Reporting

The Enhancement Plan envisions creation of a community-based Watershed Monitoring Team, consisting of 8-10 members from the local community to oversee monitoring within the watershed. Specific monitoring proposals include the following:

- **Streamflow, Sediment and Water Quality:** Installation of a stream gaging station near the Harbor High School fish ladder during the fall 2001 was recommended, and subsequently a gaging station at this location was installed in November 2001. The station is be equipped to continuously record water level, water temperature and specific conductance (a measure of salinity). These variables should be recorded at a 15-minute interval (an interval we have found most useful in characterizing basin hydrology and water quality while maximizing data storage space) and will be used to develop annual records of stream flow, water temperature, and specific conductance.

It is also recommended that several locations in the upper watershed serve as baseflow monitoring sites to establish baseflow hydrology in Arana Gulch. Water flow and water quality monitoring are also recommended for the La Fonda tributary. These data will build on the work conducted by the Coastal Watershed Council and will prove invaluable in understanding the response of the watershed to storm events. Flow measurements are an important missing ingredient in understanding Arana Gulch. They are crucial for quantitatively describing existing hydrologic conditions, which serve as the baseline for evaluating the effectiveness of the enhancement plan and in looking at long-term management. Gaging also offers a means of establishing flows and computing loadings at the time of any water-quality or sediment sampling, so that the results can be compared with those obtained from other streams or from Arana Gulch in later years.

- **Annual Reconnaissance of Watershed Conditions and Salmonid Densities:** Watershed conditions and salmonid densities need to be assessed on a recurring basis through direct field observations. Watershed conditions could be assessed annually or biannually and should be conducted by qualified professionals with the appropriate reports prepared following fieldwork. Concurrent sampling of fish populations (with an emphasis on visual sightings of salmonids) and habitat conditions in the main, western, central and eastern branches of Arana Gulch should be conducted.

The Enhancement Plan recommends that the monitoring and assessment results be summarized and presented to all involved or interested parties as completed. Interested parties include, but are not limited to, present and past project funders, technical advisory committee members, members of the Arana Gulch Watershed Alliance, including the Port District and active agencies, public works and resource agencies participating in channel maintenance and management, and property owners.

Long-Term Management

The proposed Watershed Enhancement Plan identifies the following long-term issues to be considered in the future, but specific proposals are not identified at this time:

- Conducting a riparian habitat assessment.
- Coordination with agencies and property owners regarding any future eucalyptus tree removal and protection against erosion.
- Effects of Highway 1 as a hydrological barrier.
- Removal of massive wood debris in channels due to storm events.
- Stabilization of slopes and gullies where feasible.
- Natural environmental changes such as landslides and rising sea level.
- Flood management.
- Long-term sediment management and continued review of erosion-prone areas.

TABLE 1: SUMMARY OF PROPOSED SITE SPECIFIC PROJECTS

Site #	Project	Problem	Proposal-Repair Methods	Jurisdiction / Owner
PHASE 1 – HIGH PRIORITY PROJECTS				
1	Blue Trail Dam	Right bank below existing dam is experiencing accelerated erosion and could compromise existing dam structure, leading to potential release of large volumes of sediment in event of dam failure.	Purpose: Avoid release of large volume of sediment if dam fails. Proposal: Place approximately 75 sandbags (2 cubic yards each) adjacent to dam in an area of approximately 12 feet long, 3 feet wide, and 9 feet deep. Sandbags to be filled with native dirt from area and planted with native vegetation. Further assessment of repair proposal is underway.	County of Santa Cruz / Private
3	Blue Trail Gullies	Several large gullies are contributing large amounts of sediment to channel and have compromised a City water line.	Purpose: Repair eroded area; restabilize hillslope; protect City of Santa Cruz water line; reduce sediment input through the reach. Proposal: : Lay perforated pipeline over coarse gravel for the full length of each of gullies and cover with several more inches of coarse gravel; backfill and revegetate.	County of Santa Cruz / Private
4	Steelhead Fish Barrier #5	Two four-foot diameter culverts placed in the middle of the channel are jammed at the upstream end, creating impassable barrier.	Purpose: Remove steelhead migration barrier. Proposal: Hand removal of sediment and woody debris that has been deposited in culverts.	County of Santa Cruz / County right-of-way
5	Steelhead Fish Barrier #4	Log jam, approximately 7 feet in height, creating barrier to fish passage.	Purpose: Allow for fish passage to upstream reaches on the eastern branch of Arana Gulch and stabilize downstream banks. Proposal: Hand removal of sediment and debris and deposit in adjacent forest 100 feet from stream.	County of Santa Cruz / Private
6	Steelhead Fish Barrier #3	Log jam anchored by large redwood rootwad and concrete structure in left bank, creating barrier to fish passage, though may be passable at 20-30 cfs	Purpose: Allow for fish passage to upstream reaches on the eastern branch of Arana Gulch and stabilize downstream banks. Proposal: Hand removal of sediment and debris and deposit in adjacent forest 100 feet from stream.	County of Santa Cruz / Private
7	Culvert Beneath Paul Sweet Road	Downcutting of culvert has resulted in accelerated erosion of banks downstream of culvert and impedes fish passage at all flows.	Purpose: Allow for fish passage to upstream reaches, reduce local flooding and stabilize downstream banks. Proposal: Remove and replace existing bridge and culvert with capacity to convey the 100-year flood. Build channel elevation up to current culvert mouth elevation using step-pools with optional task of constructing setline pond and trash rack roughly 50 yards upstream.	County of Santa Cruz / County right-of-way
12	Steelhead Fish Barrier #6	Driveway culvert is likely impassable under most flow conditions and contributes to downstream bank destabilization.	Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks. Proposal: Remove culvert and construct new private access bridge crossing.	County of Santa Cruz / Private

TABLE 1: SUMMARY OF PROPOSED SITE SPECIFIC PROJECTS

Site #	Project	Problem	Proposal-Repair Methods	Jurisdiction / Owner
14	Disc Golf Course	Disc Golf Course holes 1-5, 25 and 27 have large amounts of soil and are generally devoid of vegetation. Concentrated runoff through the area has resulted in accelerated downstream erosion in the gully which follows holes 20 and 21 and drains to the west.	Purpose: Reduce concentrated runoff and downstream erosion and gullyng. Proposal: Regrade an approximate 1-acre area, and import approximately 12,000-19,000 cubic yards of soil covering an area of approximately 9 acres and replant with resilient golf course turf.	City of Santa Cruz / City of Santa Cruz
PHASE 2 – MEDIUM PRIORITY PROJECTS				
2	Right Bank, Blue Trail Dam	Numerous right bank failures in conjunction with meander bends and subsequent erosion.	Purpose: Stabilize banks; protect existing adjacent trail. Proposal: Install log cribbing at 2 sites, suitably keyed to banks; plant alders behind cribbing.	County of Santa Cruz / Private
13	Pilkington Road Drainage	Concentrated runoff from hillslope above Pilkington Road is causing increased gullyng in slope adjacent to existing landslide at head of west branch. Could cause landsliding and input of sediment to basin.	Purpose: Reduce erosion and sedimentation. Proposal: Stabilize banks near culvert outlet and general drainage repairs above road to include removal of existing culvert beneath Pilkington Road and installation of new culvert.	County of Santa Cruz / Private
15	Large Gully Below Disc Golf Course	Gully contributes sediment to west branch.	Purpose: Reduce concentrated runoff and downstream erosion and gullyng. Proposal: Monitor site to determine if gully is increasing in size.	City of Santa Cruz / Public (City of Santa Cruz)
16	Lower Delaveaga Service Road	Concentrated runoff resulting in erosion and contribution of moderate volumes of sediment to west branch.	Purpose: Reduce concentrated runoff and downstream erosion and gullyng. Proposal: Stabilize banks using a step-pool form built from boulder-sized materials.	City of Santa Cruz / Public (City of Santa Cruz)
18	Greenbelt Gully	Accelerated erosion of hillslope below the corner of Agnes Street and Park Way south has resulted in a gully which directly delivers sediment to the tidal reach.	Purpose: Decrease sediment into tidal reach and Harbor. Proposal: Erosion control measures are being investigated by City of Santa Cruz.	City of Santa Cruz / Public (City of Santa Cruz)

TABLE 1: SUMMARY OF PROPOSED SITE SPECIFIC PROJECTS

Site #	Project	Problem	Proposal-Repair Methods	Jurisdiction / Owner
PHASE 3 – LOW PRIORITY PROJECTS				
8	Steelhead Fish Barrier #9	3 successive log jams, creating barrier to fish passage.	Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks. Proposal: Hand removal of wood and debris.	County of Santa Cruz / Private
9	Steelhead Fish Barrier #8	3-foot deep log jam, creating barrier to fish passage.	Purpose: Allow for fish passage to upstream reaches on the centralbranch of Arana Gulch and stabilize downstream banks. Proposal: Hand removal of wood and debris.	County of Santa Cruz / Private
10	Steelhead Fish Barrier #7	Rip-rap piled instream has created a partial dam and destabilized banks by forcing flow around the rip-rap into the banks.	Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks. Proposal: Hand removal of rip-rap, estimated at approximately 2 cubic yards.	County of Santa Cruz / Private
11	Maybee Lane Rebedding	Segment of old road roughly one quarter mile long is showing signs of gulying and concentrating runoff from the drainages above. Concentrated runoff is leading to bank destabilization along the central branch of stream.	Purpose: Prevent bank destabilization and erosion. Proposal: Restore original cross slope along road, repair gullies and restore vegetation where needed with appropriate material.	County of Santa Cruz / Private
MISCELLANEOUS PROJECTS				
17	Capitola Road Crossing	Culvert beneath Capitola Road is perched due to downcutting at downstream end and is accelerating bank erosion on the western bank, preventing fish passage during many flows.	Purpose: Further study of site is recommended to determine specific proposal. Proposal: Monitor site for future incision and bank instability downstream of existing proposal.	City of Santa Cruz / Public
19	Tidal Reach	Accelerated channel headcutting and channel bank failure through the tidal reach resulting in increased loading of sandy sediment to the Harbor and tidal reach.	Purpose: Stabilize tidal reach, decrease sediment loading into Harbor. Proposal: No specific proposal has been made.	City of Santa Cruz / Public

SECTION 3. ENVIRONMENTAL CHECKLIST FORM

BACKGROUND

Project Title: Arana Gulch Watershed Enhancement Plan

Lead Agency: Santa Cruz County Resource Conservation District
820 Bay Avenue, Suite 107
Capitola, CA 95010

Contact Person and Phone Number: Bobbie Haver, (831) 457-8132

Project Location: Portions of unincorporated area of Santa Cruz County and City of Santa Cruz

Project Sponsor: Santa Cruz County Resource Conservation District

General Plan Designation: Various – mostly residential Designations

Zoning: Various

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

	Aesthetics		Agricultural Resources		Air Quality
X	Biological Resources		Cultural Resources		Geology / Soils
	Hazards & Hazardous Materials	X	Hydrology / Water Quality		Land Use / Planning
	Mineral Resources		Noise		Population / Housing
	Public Services		Recreation		Transportation / Traffic
	Utilities / Service Systems		Mandatory Findings of Significance		

ENVIRONMENTAL CHECKLIST

1. A brief explanation is required (see Section 4--"Environmental Evaluation") for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question (see references listed in Section 6). A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that any effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4. "Negative Declaration: Less Than Significant With Mitigation Incorporated: applies where incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.
5. Earlier Analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, one or more effects have been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case a discussion should identify the following on attached sheets:
 - a) *Earlier analysis used.* Identify earlier analyses and state where they are available for review.
 - b) *Impacts adequately addressed.* Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
 - c) *Mitigation measures.* For effects that are "Less than Significant with Mitigation Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

The proposed *Arana Gulch Watershed Enhancement Plan* includes recommendations for site-specific projects focused on reduced sources of erosion and sediments and removed fish barriers. Conceptual plans have been developed for some of these projects, but detailed proposals or plans have not been developed for some project (e.g. Projects #1, 7, 13, 18, and 19). Future implementation of site-specific projects will require coordination with property owners, preparation of

engineered site plans, and approval of permits from the City or County. This Initial Study has indicated potential issues that may be associated with future recommended projects, but such projects may be subject to additional environmental review at such time that there is a specific project recommendation and design. This is also true for the proposed sediment basins which have not yet been sited or designed.

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
1. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista? (Source 6.11)				X
b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				X
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area				X
2. AGRICULTURE RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?				X
3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute to an existing or projected air quality violation? (Source 6.11)			X	

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				X
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?				X
4. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			X	
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			X	
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in section 15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?				X
6. GEOLOGY AND SOILS. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
a) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. (Source 6.6 & 6.11)				X
b) Strong seismic ground shaking?			X	
c) Seismic-related ground failure, including liquefaction? (Source 6.3)				X
d) Landslides?				X
e) Would the project result in substantial soil erosion or the loss of topsoil?			X	
f) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
g) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
h) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater?				X
7. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				X
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within mile of an existing or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
8. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?				X
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table level (for example, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?		X		
g) Place housing within a 100-year flood-hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood-hazard area structures which would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Inundation by seiche, tsunami, or mudflow?				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
9. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan?				X
10. MINERAL RESOURCES. Would the project				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? (Source 6.11)				X
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				X
11. NOISE. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies?				X
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?				X
c) Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
in the project area to excessive noise levels?				
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X
12. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X
13. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?				X
e) Other public facilities?				X
14. RECREATION. Would the project				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the				X

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
environment?				
15. TRANSPORTATION/TRAFFIC. Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (for example, result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?			X	
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks? (Source 6.6)				X
d) Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?				X
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (for example, bus turnouts, bicycle racks.				X
16. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction or which could cause significant environmental effects?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d) Have sufficient water supplies available to serve the				

3.3 ENVIRONMENTAL IMPACTS (Explanation of answers are found in Section 4.0- Environmental Evaluation)	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X
17. MANDATORY FINDINGS OF SIGNIFICANCE. Does the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				X
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of the past projects, the effects of other current projects, and the effects of probable future projects.)				X
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				X

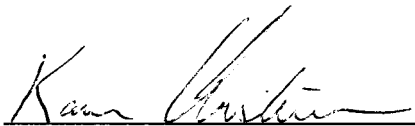
DISCUSSION OF ENVIRONMENTAL EVALUATION

See Section 4.0--ENVIRONMENTAL EVALUATION for discussion.

DETERMINATION:

On the basis of this initial evaluation:

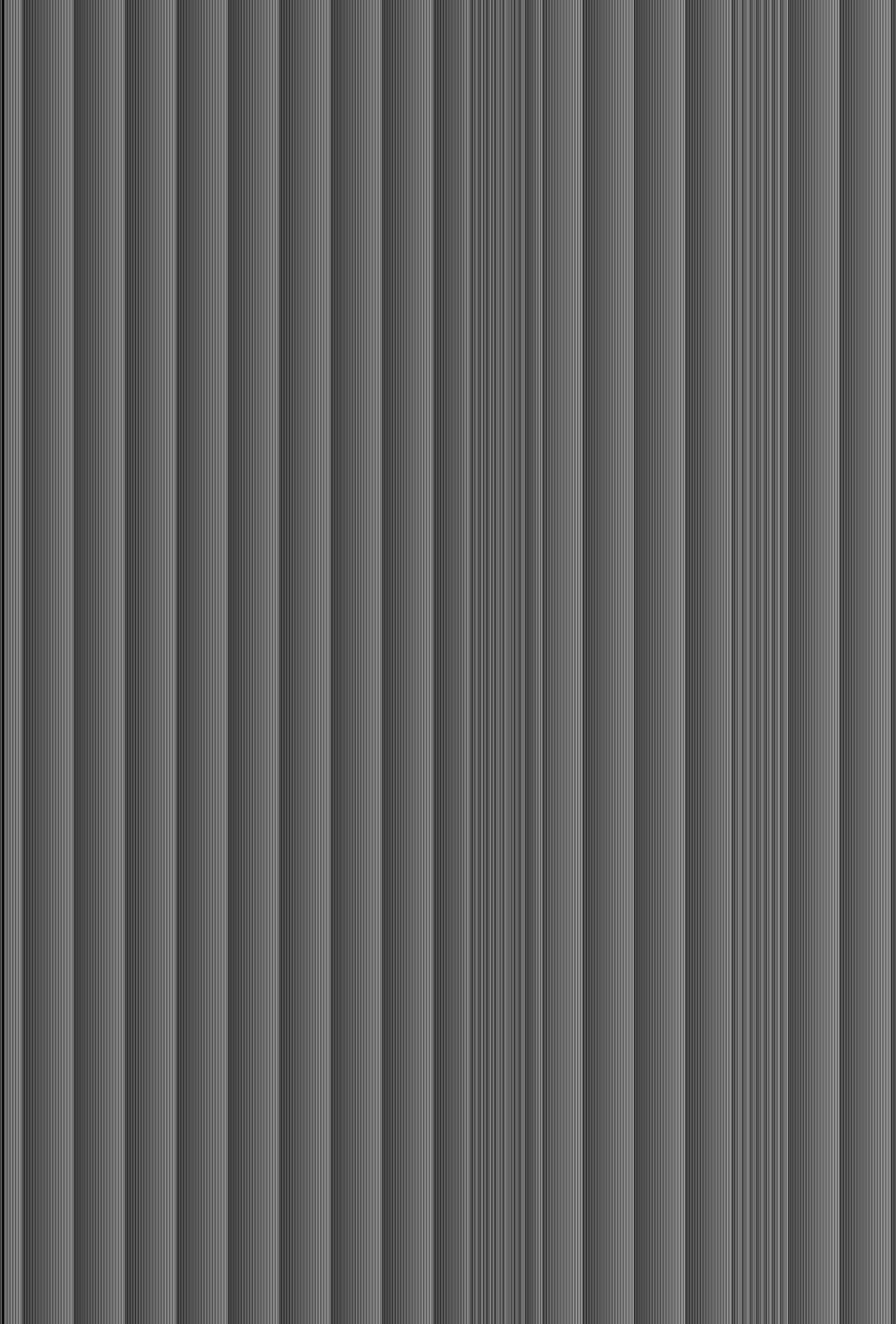
I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.	X
I find that the proposed project MAY have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT is required.	
I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.	
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	



Karen Christensen, Executive Director
Santa Cruz County Resource Conservation District



Date



SECTION 4. ENVIRONMENTAL EVALUATION

1. AESTHETICS

a-d) Effects Upon Scenic Vistas/Resources and Visual Character of the Surrounding Area. The proposed project consists of management and restoration actions for habitat enhancement purposes. The project will not result in structural development or have any adverse effects on scenic view or the visual character of the surrounding area. Vegetation and sediment removal would temporarily change the appearance of the river channel due to a reduction in vegetation. Given other remaining existing vegetation and future enhancement with implementation of revegetation recommendations contained in the Plan, this temporary change in view is considered less-than-significant.

2. AGRICULTURAL RESOURCES

The project site is not located on or immediately adjacent to agricultural lands and would have no effect upon agricultural resources.

3. AIR QUALITY

a) Consistency with Air Quality Management Plans. The project consists of adoption of a Management Plan for the Lower San Lorenzo River and Lagoon and future implementation of river management and restoration activities, primarily related to vegetation removal, revegetation, and installation of log, boulder and cobble structures within the channel for fishery habitat enhancement. The project will not result in new population or growth or inconsistencies with the existing air quality management plan for the region.

b-d) Air Emissions. The project site is located in the Monterey Bay Air Pollution Control District (MBUAPCD), which includes Santa Cruz, Monterey and San Benito Counties. The North Central Coast Air Basin (NCCAB), in which the project site is currently in attainment for the federal PM₁₀ (particulate less than 10 microns in diameter) standards and state and federal nitrogen dioxide, sulfur dioxide and carbon monoxide standards. The NCCAB is classified as a non-attainment area for the state ozone and PM₁₀ standards.

The project will not result in an increase in population or result in a new source of stationary or ongoing permanent mobile emissions. Given the short-duration and the nature of construction activities, the project will not significantly contribute to existing or projected air quality violations, and thus, will not result in a cumulatively considerable net increase for ozone or PM₁₀, or expose sensitive receptors to substantial pollutant concentrations.

Future implementation of most of the proposed repair and enhancement projects would not result in grading, excavation or direct air emissions. However, proposed regrading at Delaveaga Park (Project #14) would involve grading and import of fill on an approximate 1-acre site. This may result in a short-term, localized minor increase in dust, but the area

involved is approximately 1 acre and would not approach the Monterey Bay Unified Air Pollution Control District (MBUAPCD) "CEQA Air Quality Guidelines significance threshold," which indicate that 8.1 acres could be graded per day with minimal earthmoving or 2.2 acres per day with grading and excavation without exceeding the PM₁₀ threshold of 82 lbs/day.

RECOMMENDATION: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) where grading will occur at project sites over 1 acre in size to reduce generation of dust and potential PM₁₀ emissions. Such practices would include, but not be limited to, the following:

- Water all active construction areas daily.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

(e) Odors. The proposed enhancement projects will not result in generation of odors to adjacent recreational users or residents.

4. BIOLOGICAL RESOURCES

The City of Santa Cruz' recently released *Draft City-wide Creeks and Wetlands Management Plan* indicates that most of the habitat adjacent to Arana Gulch within City limits is characterized primarily as oak woodland riparian with some areas of mixed riparian habitat and non-native woodland (Biotic Resources Group, April 2002). According to information contained in the proposed Watershed Enhancement Plan, the vegetation of the Arana Gulch watershed can be roughly arranged into four categories according to "Flora of the Santa Cruz Mountains of California" (Thomas, John Hunter; Stanford Univ. Press 1991): wetlands and freshwater marsh, riparian, mixed evergreen/mixed broadleaf forest, and a few patchy areas of chaparral habitat.

Freshwater Marsh. The freshwater marsh begins at the upstream end of the north harbor and extends in a broad plain through the City's Greenbelt area to the Capitola Road crossing. There appears to be some saltwater intrusion during winter high tides and the downstream waters may be brackish for short intervals. The lower banks of the marsh are dominated by sedges (*Carex* spp), low club rush (*Scirpus cernuus californicus*), and bog rush (*Juncus effusus*). Willow thickets comprised of arroyo willow (*S. lasiolepis*) and red willow (*S. laevigata*), with an understory of California blackberry (*Rubus ursinus*) and pacific poison oak (*Rhus diversiloba*) characterize the mid-level banks. The upper banks are dominated by coast live oak (*Quercus agrifolia*) in distinctive sparse oak woodland habitat, with open grassy areas in the Greenbelt.

Non-native invasive blue gum eucalyptus trees (*E. globulus*) dominate the east bank of the harbor area. Other non-natives include Himalaya berry (*R. procerus*) and ornamental escapees.

Riparian. From the upstream end of the marsh area to approximately Highway 1, the streambanks rise in elevation to drier, but still frequently inundated soils. Dominant are a mix of coast live oak, red alder (*Alnus oregona*), California buckeye (*Aesculus californica*), and willow. There is also a sparse occurrence of big-leaved maple (*Acer macrophyllum*) and western creek dogwood (*Cornus occidentalis*). These trees afford abundant cover, insect and bird habitat, and shade to the stream throughout most of the mainstem and its tributaries. The understory is comprised of California blackberry and poison oak.

The mainstem streambank area from Harbor High School north into Delaveaga park is heavily populated with non-native invasive acacia (*Acacia longifolia*), French broom (*Cytisus monspessulanus*), and pampas grasses (*Cortaderia jubata* and *C. selloana*), with a robust understory invasion of English ivy (*Hedera helix*), periwinkle (*Vinca major*), poison hemlock (*Conium maculatum*), and Himalayan blackberry.

Mixed Evergreen/Mixed Broad-Leaf. The upslope areas of the watershed are characterized by less water dependent plants, the dominant being coast live oak and tanbark oak (*Lithocarpus densiflorus*), Douglas fir (*Pseudotsuga menziesii*), with a shrub understory of evergreen huckleberry (*Vaccinium ovatum*), coyotebrush (*B. pilularis* var. *consanguinea*), and bush monkeyflower (*Mimulus aurantiacus*). In disturbed areas and drainages from disturbed areas non-native invasives such as pampas grasses, brooms, vinca, English ivy and forget-me-not (*Myosotis latifolia*) are becoming abundant.

Chaparral. There are a few south-facing steep areas of the watershed that exhibit disjunct patches of chaparral. These areas are dominated by scrub oak (*Quercus berberidifolia*), bush monkey flower, California lilac (*Ceanothus integerrimus*), and buck brush (*C. cuneatus*). Due to the relatively inhospitable terrain, few other plants thrive on these steep dry slopes other than the occasional pampas grass clumps.

(a) Special Status Species. The City of Santa Cruz' recently released *Draft City-wide Creeks and Wetlands Management Plan* conducted an assessment of special status plant and wildlife species potentially occurring within or adjacent to City streams, including the portion of Arana Gulch located within City limits. The assessment was based in part on a records check with the California Department of Fish and Game's "California Natural Diversity Data Base" (CNDDB). Summaries of potential special status species are provided in Appendix A.

The assessment indicated that no special status plant species or known or expected to occur within riparian habitats, and the two potential plant species are associated with seasonal wetlands (Biotic Resources Group, April 2002). Existing or potential special status species occurring within the project area include: Monarch butterfly, tidewater goby, and steelhead trout, which are further discussed below. Several special status bird and bat species potentially nest or roost in habitat adjacent to Arana Creek. This is reviewed below under subsection 4.d—"Wildlife Movement/Breeding." Within the City of Santa Cruz, the federally threatened California red-legged frog (CRLF) is known to occur in the Moore Creek watershed,

but there are no records of CRLFs in Arana Creek, and recent surveys of ponds at Delaveaga Golf Course did not find this species (Ibid.).

Monarch Butterflies. A portion of Delaveaga Park is a mapped Monarch butterfly habitat area as identified in the City's General Plan (Map EQ-9). According to previous surveys conducted for the Emergency Communications Center and the Delaveaga Vegetation Management Plan, there have been past observations of monarchs within Delaveaga Park (MHA Environmental Consulting, September 1997). A Monarch survey conducted by Monarch Butterfly Specialist, Kingston Leong in October through December of 1996, observed Monarch butterflies in the eucalyptus area northeast of the Emergency Communications Center site, but concluded that the eucalyptus grove in the vicinity does not possess the type of microclimatic conditions necessary to support overwintering butterflies either as an autumnal or permanent site (Ibid.).

Implementation of future projects proposed within the Watershed Enhancement Plan would not be within potential Monarch butterfly use areas, except for the regrading project at Delaveaga Park (Project #14). However, this proposal would not result in removal of trees, nor is the grove at Delaveaga Park a known overwintering site. The proposed Plan also advocates long-term coordination of eucalyptus tree removal in order to prevent erosion and sedimentation into Arana Gulch. Any future project at Delaveaga Park would require the consent of the property owner (City of Santa Cruz) and approval of grading permits. However, it is recommended that best management practices be implemented to schedule future grading operations during the time of the year when Monarch butterflies would not be at this site.

RECOMMENDATION: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) to require any scheduling of grading at Delaveaga (Project #14) outside of the Monarch butterfly overwintering period.

Tidewater Goby. The tidewater goby (*Eucyclogobius newberryi*) is a federally endangered species and a State Species of Special Concern that occurs in coastal lagoons. Historically tidewater gobies occurred in Woods Lagoon. Steelhead trout are federally and State listed as threatened. The species was last observed in 1984, but sampling in 1992 and 1995 found no evidence of tidewater gobies in Upper Harbor/Lower Arana Gulch area (Biotic Resources Group, April 2002). The proposed Watershed Enhancement Plan has reviewed the lower gulch area (Project #19), but no specific proposals are recommended at this time.

Steelhead Trout. Steelhead trout (*Oncorhynchus mykiss*) is federally listed as a threatened species, and is a state Species of Special Concern that is known to occur in Arana Creek. This section is based on fisheries studies conducted by D.W. Alley & Associates (May 2000) as part of the preparation of the Watershed Enhancement Plan. Adult steelhead migrate upstream typically between December and May. Smolts migrate downstream typically from March through June. Steelhead require spawning sites with gravels and small cobbles (from ¼" to 3 ½" diameter) having a minimum of fine material (sand and silt) mixed with them and with good flows of clean water moving over and through them. Except in streams with high mean summer flow (greater than .2 to .4 cfs per foot of stream width), steelhead generally require two summers of stream residence before reaching smolt size. This is likely the case in

Arana Gulch. Juvenile steelhead are generally identified as young-of-the-year (first year) and yearlings (second year).

Arana Gulch Fishery Habitat Conditions: Based on the fishery surveys and assessment conducted as part of the proposed Watershed Enhancement Plan, nine steelhead migrational barriers were mapped in the Arana Gulch watershed (see Figure 4). The assessment indicates that poor spawning success and limited rearing habitat (shortage of cover and food) were probable causes of low numbers of Y-O-Y's in Reaches 1-3. Poor spawning success, likely poor spawning access and poor rearing habitat (a shortage of cover and food) in Reaches 4-6 were likely explanations for low densities of Y-O-Y's there. Spawning habitat was extremely poor in 1999 because substrate at the tails of pools, where spawning was likely to occur, was primarily fine silt and sand. Spawning gravel was essentially non-existent in suitable spawning locations. However, the high storm flows in January 2000 deposited larger gravels in several reaches, improving spawning conditions.

Rearing habitat was generally limited due to shallow pool depths. In some instances, pool depth is controlled by the presence of scour objects. In Arana Gulch, scour objects such as bedrock and large boulders were lacking. Therefore, overall measured pool depths were shallow. Concrete structures and shopping carts were scour objects in reaches 1 and 2, with woody debris and tree rootwads being most important in upstream reaches. The fine sediment load filled in a high percentage of available pool habitat. If sediment input to the stream was reduced, pool depth and habitat quality may improve. However, the preponderance of shallow glides and fine sediment would not improve without increased natural or artificial introduction of scour objects to the system.

Salmonids in Arana Gulch probably rely heavily on insects falling into the stream from overhanging riparian vegetation as a source of food. Low densities of yearling and older salmonids were likely due to poor rearing habitat in shallow pools, limited cover and a shortage of food. Water depth affords cover when it becomes greater than 1.5 feet. Field reconnaissance after the January 2000 storm flow indicated an increase in larger substrate in riffles, affording better aquatic insect habitat than seen previously. These periodic improvements in coarse substrate after large storm flow events are typical of coastal streams. However, considerable fine sediment also entered the channel to be rearranged during ensuing storm flows. This sediment may bury much of the coarser substrate before the winter rainy season ends. Streambed elevation in Reach 4 was more than 2 feet lower than after the 1982 storm event indicating that perhaps the watershed is recovering from massive sedimentation from that storm, and that substrate conditions may improve somewhat in the future.

Densities of yearling and older salmonids are usually regulated by water depth and the amount of escape cover that exists during low-flow periods of the year (July-October). Substrate larger than 4 inches is extremely scarce in Arana Gulch, which is required for aquatic insect production in riffles, may severely limit aquatic insect production for fish consumption. Salmonids in Arana Gulch may rely almost totally on insects falling into the stream from streamside vegetation for food.

Figure 2 in subsection 2.0 illustrates the reaches of highest fish habitat value (thick red line) in Arana Gulch along with the watershed sediment sources and fish passage barriers. The reaches of highest fish habitat value account for 1.4 linear miles of stream and are located on the eastern branch (0.6 miles), central branch (0.4 miles) and the mainstem (0.4 miles). These reaches were chosen to have the highest fish habitat value from:

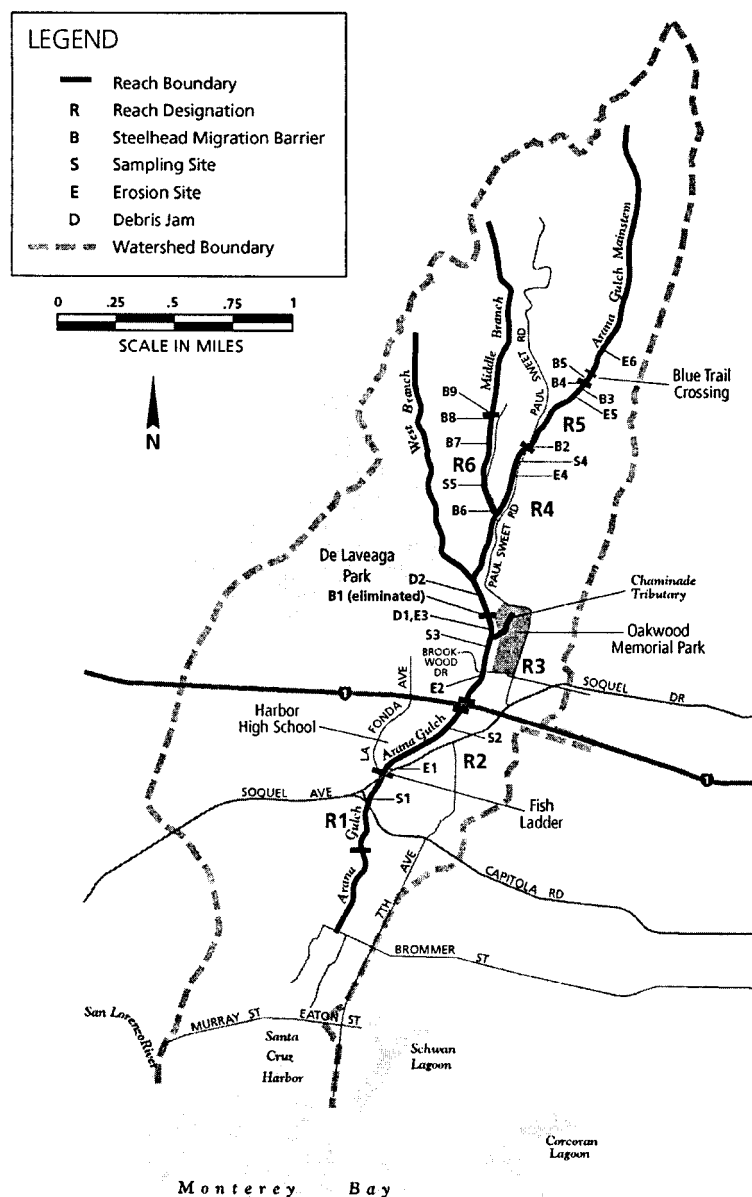
- reach fish densities measured in 1999 in reaches 3, 4 and 6 (see Figure 4),
- potential fish densities if all downstream fish passage barriers were removed, and
- habitat characteristics of the additional upstream channel reaches (above barriers) such as the availability of spawning gravel on the channel bed.

The reaches of high habitat value on the central branch and eastern branches are currently limited by accessibility due to fish passage barriers (sites) 12 and 7, respectively (see Figure 4). The reach of high habitat value on the eastern branch is further limited in access by fish passage barriers (sites) 6, 5 and 4 (see Figure 4). These passage barriers are currently limiting the migrational success of steelhead and need to be removed or modified to improve access to the upstream reaches of high habitat value.

The reach of high habitat value on the mainstem corresponds to Reach 3 which is not impacted by downstream fish passage barriers but is however, impacted by sand size sediment which is found on the channel-bed and banks through this reach. This reach is estimated to have the highest number of yearlings during sampling in 1999. To the extent possible, conditions through this reach (deeper pools and cover) should be maintained in order to support the yearling class of steelhead in Arana Gulch. Repair of upstream sediment sources and preservation of summer baseflows are central to maintaining the high habitat value through this reach. This reach is downstream of all the sediment sources mapped in the upper watershed. Therefore, this reach is impacted cumulatively from upstream sediment sources. Immediate repair of the larger sediment sources in the upper watershed, such as sites 3, 13 and 14 are key to the recovery of downstream habitat in the future.

Watershed Enhancement Plan Elements and Impacts: The key objective of the proposed Enhancement Plan is to improve steelhead habitat in Arana Gulch, through reduction of sediment sources and removal of fish barriers. Even the best habitat in Arana Gulch, at least at present, is rated as substandard relative to other streams in Santa Cruz County (Alley, May 2000). With less sand in the channel, the number of young fish rearing in Arana Gulch is expected to increase, but is likely to remain small relative to other streams in the Santa Cruz Mountains. Nonetheless, the relatively large number of yearling fish observed in the east and central branches suggest that Arana Gulch can sustain a run worth enhancing (Balance Hydrologics, February 2002).

The Plan proposes 7 projects to eliminate fish migration barriers (Projects #4, 5, 6, 8, 9, 10, and 12). Table 2 identifies estimated increases in steelhead production with removal of fish barriers. Thus, the plan will result in a beneficial impact upon steelhead habitat.

FIGURE 4: LOCATIONS OF FISH BARRIERS & SAMPLING

D.W. ALLEY & Associates
P.O. Box 200
Brookdale, CA 95007

FIGURE 1. Fishery-related Mapping of the
Arana Gulch Watershed
May 2000

SOURCE: D. W. ALLEY & ASSOCIATES, MAY 2002

TABLE 2: STEELHEAD BENEFITS FROM REMOVAL OF FISH PASSAGE BARRIERS

Steelhead Benefits from Removal of Fish Passage Barriers ^a						
Passage Barriers to be Removed	Location of Habitat Added with Barriers Removed	Linear Distance of Habitat Added	Estimated Increase in Juvenile Steelhead Production		Estimated Cumulative Increase in Juvenile Steelhead Production	
site #	reach limits	(feet)	(number of steelhead)		(number of steelhead)	
			young-of-year	yearlings	from	to
12, 11 and 10	site 12 to site 8 ^b	1900	177	59	367 ^f	603
7 and 6	site 7 to site 6 ^c	2000	146	34	603	783
6, 5, and 4 ^d	site 6 to site 1 ^e	3000	219	51	783	1053
1	upstream of site 1 ^{e, g}	4000	292	68	1053	1413

Notes: a. The estimated increase in total juvenile steelhead production was based on the assumption that passage barriers and impediments would be removed

b. Estimated increase in juvenile steelhead production for the reach from site 12 to site 8 was based on steelhead/resident trout densities estimated for Reach 6 in 1999

c. Estimated increase in juvenile steelhead production for the three reaches defined from site 7 to site 6, site 6 to site 1 and upstream of site 1 respectively, were based on steelhead densities estimated for Reach 4 in 1999

d. Sites 6, 5 and 4 are in close proximity and should be removed at the same time to have benefit for the steelhead population.

e. Production estimates made for the reach upstream of site 1 were based on the assumption that perennial flow exists for several thousand feet upstream of site 1 in most years. If the reach goes dry, no benefit would be realized by the steelhead population.

f. Represents the total number of juvenile steelhead produced in 1999 in reaches 1, 2, 3 and 4. Totals for reach 6 in 1999 were not included.

g. Table input data was prepared by D.W. Alley & Associates while the table was prepared by Balance Hydrologics.

Most of the future repair projects do not include construction in the Arana Creek stream channel. Removal of fish barriers (Projects # 4, 5, 6, 8, 9, 10) will involve limited access in the channel to manually removal of debris and barriers, which is proposed to be conducted under the supervision of a fisheries biologist. Given the relatively low area of disturbance, this is considered a less-than-significant impact unless removal.

Some projects that involve removal of culverts or other channel modifications may be required to dewater the site for construction and could have indirect impacts upon steelhead. This potential exists for proposed Projects #1 (Blue Trail Dam), #7 (Culvert beneath Paul Sweet Road), #12 (Fish Barrier-Driveway Culvert), and #16 (Lower Delaveaga Park Gully). Projects that will require dewatering will need to be implemented in a manner that maintains flows and prevents erosion. Although indirect impacts are not considered significant due to the limited area of disturbance and the likely short-term duration of the planned construction activities, any potential effect upon the habitat of a federally listed species would be considered potentially significant.

Any project activity that is within the creek channel should be conducted outside the steelhead migration period, which is generally between December and June. Any work in the creek channel also will require approval of a Streambed Alteration Agreement by the California Department of Fish and Game (CDFG). Such an agreement has already been approved for Project #12 (see Appendix B for further details.)

MITIGATION MEASURE 1: Adopt and implement “Best Management Practices” (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) to require that any future repairs or work in the channel be conducted outside steelhead migration period and that the use of coffer dams and dewatering be implemented to maintain bypass flows and prevent erosion.

b-c) Riparian and Wetland Habitat Areas. Oak-woodland and mixed riparian habitat exists along some segments of Arana Creek. The proposed Watershed Enhancement Plan recommends several repair projects that are located within riparian habitat or may contain small amounts of wetland habitat (Project #2, 3) and/or riparian habitat (Project #1, 2, 3, 13). If not carefully implemented, these projects could result in minor loss of riparian species and minor amount of wetland fill (at Project site #2). The areas impacted would be relatively small in size (i.e. 500-1000 square feet or less), and riparian and wetland vegetation would regenerate. Thus the impact would be considered temporary and less-than-significant. However, future work activities within riparian areas should be conducted after an assessment by a qualified biologist to ensure that removal of riparian vegetation, indirect impacts to riparian vegetation (i.e., placement of sediments or other materials), and wetland fill is avoided or minimized.

RECOMMENDATION: Adopt and implement “Best Management Practices” (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) to require that any future repairs or work in areas of riparian and/or wetland habitat be conducted after consultation with a qualified biologist to ensure that removal of or impacts to riparian and wetland vegetation is minimized.

(d) Wildlife Movement/Breeding. Several special status bird species are known or potentially nest in the Arana Gulch watershed including with Cooper's Hawk and yellow warbler, both State Species of Special Concern, although the yellow warbler has not be found in recent years (Biotic Resources Group, April 2002). All native nesting birds, even non-special status species, are fully protected under the federal Migratory Bird Treaty Act. If nesting is present, any disruption during the nesting season would be considered significant. The nesting season generally occurs between early March and late July.

Implementation of future repair projects would result in potential disruption of nesting birds, if they are present, due to tree removal, which may occur in a limited amount for Project #2 or where equipment noise and construction activity could affect nesting birds (particularly raptors) in trees adjacent to the retaining wall construction zones (i.e., Project #3). Most of the proposed activities would be done without use of heavy equipment. However, any tree removal and/or construction within riparian areas should be conducted outside the breeding season.

MITIGATION MEASURE 2: Adopt and implement "Best Management Practices" (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) to require that if construction, including tree removal, is scheduled to begin between March and late July, a pre-construction nesting survey will be conducted by a qualified wildlife biologist to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors are found, construction may need to be delayed until late-August, or after the wildlife biologist has determined the nest is no longer in use.

(e-f) Conflicts with Local Policies/Habitat Conservation Plans. There are no Habitat Conservation or Natural Community Conservation Plans for the project area. See section 9—LAND USE—below regarding project consistency with Santa Cruz County General Plan policies.

5. CULTURAL RESOURCES

(a-d) Historical and Cultural Resources. The proposed project consists of adopted of a watershed enhancement plan and future implementation of improvement projects along the channel to reduce sedimentation into Arana Gulch, thereby improving steelhead fishery habitat. None of the proposed improvement projects will result in heavy grading or excavation. Portions of the project area are not highly accessible and are limited by steep slopes and dense vegetation, and appears to have a low potential for buried cultural resources. The project will not result in subsurface excavation, but will add fill to an eroded road area after the retaining wall construction is completed. Although, no impacts to cultural resources are expected, there is a possibility of unidentified (e.g., buried) cultural resources being found during construction, and thus, the following measure is recommended.

RECOMMENDED CONSTRUCTION SPECIFICATION: If archaeological resources or human remains are accidentally discovered during construction, work shall be halted within 50 meters (150 feet) of the find until it can be evaluated by a qualified

professional archaeologist. If the find is determined to be significant, appropriate mitigation measures shall be formulated and implemented.

There are no historical structures in the vicinity. No paleontological resources or unique geologic features have been identified in the General Plan (per Policy 5.9.1) or observed on the site.

6. GEOLOGY AND SOILS

(a-c) Seismic Hazards. The project area is located in a highly seismically active region of California. The property is located approximately 17 miles west of the active San Andreas Fault and approximately 12 miles southwest of the Zayante fault zone. Given the distance to the faults, including the closest--Zayante fault--ground rupture at the site is considered a very low possibility. There are no other mapped faults in the project area, although the area would be subject to intense ground shaking resulting from earthquakes on vicinity faults. The potential for seismic activity in the area is high due to nearby active faults (San Andreas) and the liquefaction potential of soils. The proposed project consists of watershed enhancement actions, which are non-structural and will not expose persons or structures to seismic or geotechnical hazards.

(d-h) Geology, Soils and Erosion. The information in this section is summarized from the proposed Watershed Enhancement Plan and technical sediment studies conducted as part of the preparation of the Plan by Balance Hydrologics, Inc. There are three types of geologic deposits found in the Arana watershed. These include the following:

- **Purisima Formation.** The weakly consolidated siltstones, sandstones, and (locally) mudstones of the Purisima formation underlie the entire Arana watershed. The bedrock Purisima sediments are composed of a series of almost flat-lying beds, seemingly continuous across the watershed.
- **Marine Terraces.** Marine terraces, with nearly flat-lying deposits of well-sorted sands with thin, discontinuous gravel-rich layers cover most of the flat upland benches in the southern half of the watershed, as well as the flat ridgetops near Santa Cruz Gardens and Pilkington Road in the northern half of the watershed. The marine terraces form nearly flat and well-drained surfaces upon which deep, stable soils have developed. Erosion rates in relatively undisturbed small watersheds formed mainly in marine terraces can be very low – typically on the order of 5% of the rates observed in other Santa Cruz Mountains basins. Most of the urban uses within the Arana watershed are constructed on marine terraces, which although disturbed, are usually not major sources of sediment except during periods of construction activity.
- **Alluvium.** Sandy alluvium and stream terrace deposits along Arana Gulch and its headwater forks, widening from partly discontinuous valley floors in the headwaters to a single continuous valley flat up to 800 feet wide downstream from Highway 1. The alluvium and stream terraces are formed of the material transported by Arana Creek and

its tributaries. This material is typically moderately to extremely sandy. The alluvium is deepest in the lower portion of the watershed.

Soils. There are numerous soil groups present in Arana Gulch watershed, which are identified and characterized in the Enhancement Plan, based on the 1980 Santa Cruz County Soil Survey. General soil characteristics differ from the upper watershed to the lower watershed. For the purpose of briefly discussing soils here, the upper watershed will be defined as that area upstream of the confluence between the main branch and the western branch, the lower watershed is respectively located downstream of this confluence. These two areas have markedly different physical characteristics and thus have had soils develop that are a product of these differences.

Soils present in the upper watershed are deep to shallow with depth zones ranging from 0 to 4.5 feet, depending on hill slope where the soils are found. These soils range from well drained to somewhat excessively drained and consist of gravelly sandy loams, stony sandy loams, sandy loams, loams and shaly clay loams. The gravelly sandy loams, loams and the shaly clay loams are found on the steepest slopes in the upper watershed. The soils present in the upper watershed have formed in residuum derived from sandstone, shale, siltstone, mudstone, marine deposits and granitic rock. Erosion hazard rating for these soils range from slight to very high with most soils rated as moderate to very high. Under saturated conditions, relative rates of runoff for these soils range from medium to very rapid. In general, as slope increases, runoff rates for saturated soils increases.

Soils present in the lower watershed are deep to very deep with depth zones between 0 and 4 and a half feet and are well drained to somewhat poorly drained. These soils consist of stony loams, sandy loams, loams and shaly clay loams. Other than the Bonny Doon Loam, the soils in the lower watershed developed in residuum from different parent materials than those found in the upper watershed. Parent materials for most of the soils in the lower watershed (at least 95 percent) consist of marine deposits, old alluvium and weathered shale. Erosion hazard rating for these soils ranges from slight to high and rates of runoff under saturated conditions ranges from slow to rapid.

Sediment Assessment. As part of the preparation of the proposed Enhancement Plan, a sediment assessment was conducted for Arana Gulch by Balance Hydrologics in order to:

1. Establish baseline conditions for channels and hillslopes in Arana Gulch;
2. Map and estimate volumes and rates of material contributed by major sediment sources to the channel;
3. Construct sediment delivery estimates for most of the past 20 years calibrated by harbor dredging records and field estimates of volumes and rates of material contributed to the channel;
4. Identify the size range of material found on the bed, banks and flood plains of Arana Gulch; and
5. Characterize sediment sources in the watershed which have potential for management through implementation of restoration activities.

Table 3 presents data for the total volume of sediment lost at each sediment source mapped in the watershed. (See Figure 4 for locations of erosion sites.) Sediment sources include channel bank and bed sediment sources (Sites 1,2) and hillside erosion (Sites 3, 13, 14, 15, 16, and 18). The proposed Plan calls for repairs at these sites to reduce and eliminate sources of sedimentation in order to improve fishery habitat. Thus, the project will result in beneficial impacts.

TABLE 3: SEDIMENT LOSS ESTIMATES			
Site	Area [1]	Volume	
		Cubic Feet	Cubic Yards
1. Blue Trail dam: right bank below dam	20x40x12	9600	350
2. Right Bank Meanders below blue trail dam	49x18x8	7056	261
2. Right Bank Meanders below blue trail dam	35x15x6	2520	93
2. Right Bank Meanders below blue trail dam	25x6x5	750	28
3. Blue Trail Gullies	200x135x9	243,000	9,000
13. Pilkington Road drainage	48x12x75	40,300	1,492
14. Disc Golf Course	~ 1 acre	-	~1,700 to 3,300
15. Large Gully beneath Disc Golf Course	8x6x1000	48,000	1,778
16. Tributary from west at lower service road	11x11x75	9,000	333
[1] Area Dimensions (ft x ft x ft). Source dimensions, except for site 14, were measured by Balance Hydrologics in the fall of 2000			
Sites 18 and 19 were excluded from this table because source dimensions were not measured.			
SOURCE: Balance Hydrologics			

7. HAZARDS AND HAZARDOUS MATERIALS

(a-d) Hazardous Materials/Wastes. The proposed project consists of adoption of a watershed enhancement plan, and future implementation of repair projects to reduce erosion and sedimentation into Arana Creek and improve steelhead fishery habitat. The project does not involve the transport, use, or disposal of hazardous materials or wastes and would not result in creation of a public health hazard. The project site is not located on a hazardous material site.

(e-f) Airport Safety. The project site is not located near a public airport or private airstrip.

(g) Emergency Response Plans. The project is located within a forested area within a rural portion of the county and the temporary construction activities would have no effect on or interfere with adopted emergency response or evacuation plans for the area.

(h) Wildland Fire Hazards. Portions of the proposed project are located within a forested area, but the project would not result in construction of habitable structures or new development within wildland areas subject to fire hazards or result in increased human exposure to wildland fire hazards.

8. HYDROLOGY AND WATER QUALITY

(a,f) Water Quality. Results for water quality measurements made in Arana Gulch from 1997 to 1999 indicate that, for the constituents test, the water quality meets standards for domestic consumption and fell within acceptable ranges for salmonid survival. Water quality parameters measured include water temperature, dissolved oxygen, pH, specific conductance and turbidity. It is important to note, however, that the potential for excessive summer water temperatures does exist in Arana Gulch due to (a) the very low baseflows that were measured and (b) the potential for the riparian corridor to be compromised in this urban corridor within multiple jurisdictions.

Water quality measurements were taken from November 26, 1996 to December 31, 1999 by Coastal Watershed Council staff and volunteers. These measurements were taken in order to establish a baseline so that future changes in water quality can be evaluated and to provide a quantitative basis for identifying which constituents pose (and do not pose) problems for maintaining a successful steelhead run and a viable riparian corridor which can safely sustain recreation and other aquatic biota. Measurements were made of water temperature, dissolved oxygen, turbidity, specific conductance and pH, some of which are constituents that had been identified in previous reports as potentially limiting to steelhead populations statewide. Results of the monitoring as presented in the proposed Watershed Enhancement Plan are summarized below.

- **Turbidity.** Turbidity is a measure of how much particulates and other matter in water interfere with the water's ability to pass light, and an index of the concentration of sediment or algal matter in the water. During the period of monitoring, the highest turbidity levels were consistently measured in the winter months, when turbidity is due primarily to sediment eroded from the watershed and moving to Monterey Bay; the lowest levels were consistently measured during summer, when the minimal turbidity that can be discerned is generally associated with algae and organic debris. Similar turbidity levels were measured in the upper as well as the lower watershed on most dates. The highest levels were measured at all stations during the wet and stormy 'El Nino' winter of 1997/1998. Turbidity levels were suitable for growth of fish and all other aquatic or riparian biota during non-storm periods.
- **Dissolved oxygen.** Dissolved oxygen, or "D.O.", is a measure of oxygen available in the water for fish and other aquatic biota to breathe. Healthful decomposition of organic matter and of waste products of fish and other animals (including humans) are also promoted by the presence of dissolved oxygen. D.O. is, in part, dependent upon the temperature of the water, with saturation concentrations decreasing with higher

temperature. Commonly, dissolved oxygen levels approaching or reaching saturation are considered beneficial for growth of salmonids at every life stage.

Values observed in Arana Gulch confirmed a pattern of adequate dissolved oxygen in headwater and mid-basin reaches, coupled with moderately to chronically depressed D.O. within the tidal reach near the mouth. D.O. concentrations were almost always above 5 mg/L upstream of the culverts at the upper end of the harbor. Within the tidal reach, lower D.O. measurements are typical of seawater and tidal systems. Barring accidental, large sewage spills into the creek, the Enhancement Plan technical studies do not anticipate any oxygen problems upstream of the tidal reach in Arana Gulch. If monitoring of D.O. is to continue, one of the more important objectives would be monitoring dissolved oxygen in unshaded areas during summer months of dry years, when flows are critically low.

- Specific Conductance. Specific conductance is a measure of water's capacity to transmit an electrical current. Specific conductance (or, informally, 'conductivity') is highly correlated with the concentration of total dissolved solids, or "salts", in the water, and is used worldwide as a convenient field index for total dissolved solids. Conductivity is rarely a limiting factor for fishes in freshwater streams except during accidental chemical spills, and was not limiting to steelhead in Arana Gulch above the tidal reach.
- pH. For the period of monitoring, the range of pH values varied only slightly from a low of 7.00 to a high of 8.00. These are typical values for central coast streams in California, where pH is not limiting to fishes. The pH levels recorded in Arana Gulch were within the acceptable range for salmonids survival at all life stages and thus were not a constraining factor in habitat suitability, either directly or indirectly. Further monitoring of pH is deemed unnecessary except after accidental chemical spills.
- Water Temperature. Water temperature of Arana Gulch is of interest principally for its effect on aquatic organisms. Stream temperature varies daily and seasonally, and over the course of a cycle of hot-sunny and cool-foggy days during the dry season. Similarly, steelhead and other aquatic biota have temperature tolerances that vary with their life stages and geographic location. Measurements of water temperature in Arana Gulch were made at all sites, most commonly from December 1996 through April 1999. Summer temperatures were generally below 18°C (64.4°F). Fishery biologist, Don Alley, has observed that when daily water temperatures reach approximately 21°C (70°F) or greater in summer, juvenile steelhead restrict their microhabitat distribution to fastwater habitat (riffles, runs and heads of pools) due to increased metabolic demand.

Implementation of the proposed Watershed Enhancement Plan and subsequent future implementation of recommended repair projects will result in beneficial impacts to water quality through reduction of erosion and sediment loads. Furthermore, the Plan identifies ongoing water quality monitoring.

Implementation of the proposed site-specific projects could result in minor amounts of erosion if not properly controlled. However, most of the projects are small in scale and likely will not involve heavy equipment, except for regrading at Project site #14, which would involve grading and importation of fill on an approximate 1-acre site. If not properly managed, grading could

result in localized erosion. Implementation of erosion control measures will ensure that construction materials and/or sediments are not inadvertently released into the channel during future repair activities. Though repairs at most sites will not involve heavy equipment, Best Management Practices should be implemented to prohibit equipment or maintenance of equipment in the channel in order to protect water quality.

MITIGATION MEASURE 3: Adopt and implement “Best Management Practices” (BMPs) (see section 5.0 of this Initial Study for further discussions of BMPs) to control erosion and require that all construction materials and fill be stored and contained in a designated area that is located away from channel areas to prevent inadvertent transport of materials into the adjacent stream channel. Prohibit fueling, cleaning or maintenance of equipment except in designated areas located as far from the creek as possible. As a precaution, require contractor to maintain adequate materials onsite for containment and clean-up of any spills.

(c-e) Alteration of Drainage Patterns or Increased Runoff. Implementation of the proposed Enhancement Plan will not result in structural development or increases in runoff.

(b) Groundwater. The proposed project activities do not entail the withdrawal of groundwater, interception of an aquifer, or changes to groundwater recharge capability.

(g-i) Flood Hazards. Implementation of the proposed Enhancement Plan will not result in structural development, exposure to flood hazards or alteration of stream channels.

i-j) Dam Failure/Tsunami Inundation. According to the City’s General Plan maps (Map S-8 and S-9), a portion of the lower Arana Gulch is located within a tsunami area (south of Soquel Drive), as is most of the downtown and beach areas of Santa Cruz. Implementation of the proposed Watershed Enhancement Plan would not result in new development or increased exposure to tsunami hazards. The National Oceanic and Atmospheric Administration operates a tsunami warning system giving several hours notice to allow evacuation of threatened areas to prevent injuries.

9. LAND USE AND PLANNING

The project action consists of adoption of a Watershed Enhancement Plan and future implementation of recommended site specific projects that are intended to reduce sedimentation into Arana Creek and improve steelhead fishery habitat. The majority of the Arana Gulch watershed is located with the City of Santa Cruz (see Figure 1), while the upper reaches are located within the unincorporated County of Santa Cruz.

City of Santa Cruz Plans. The proposed Plan is consistent with the City’s General Plan Environmental Quality goals that seek to protect surface water quality and protect and enhance wildlife habitats. In particular, the project is consistent with Environmental Quality Policy 3.1.4, which directs the City to work with the County and Port District to reduce erosion and sedimentation in Arana Gulch.

County of Santa Cruz Plans. Riparian corridors are identified as sensitive habitats in the County of Santa General Plan/Local Coastal Plan (LCP). Implementation of the proposed Watershed Enhancement Plan will not result in structural development or loss of habitat. Implementation of future repair projects recommended in the Watershed Enhancement Plan may result in some localized less-than-significant impacts to riparian vegetation as discussed under subsection 4—BIOLOGICAL RESOURCES—above, which can be minimized with the recommendations outlined above. Thus, sensitive habitat areas, including areas that support special status species, will be protected against any disruption of habitat values, and consistent with Policy 5.1.6 and Policy 5.1.10. Any land alteration or vegetation disturbance within riparian corridors may be required to obtain approval from the County pursuant to County regulations.

The overall intent of the proposed site-specific projects, however, is to reduce sedimentation into Arana Gulch and improve steelhead habitat, which is consistent with Policy 5.1.6 that indicates any proposed development within or adjacent to sensitive habitats must maintain or enhance the functional capacity of the habitat. The Plan goals and objectives also are consistent with Policy 5.1.10, which seeks protection of rare, endangered or threatened species.

The project will not result in direct discharge of materials into Arana Gulch. As discussed above under subsection 8—HYDROLOGY AND WATER QUALITY—construction practices will be controlled and erosion control measures implemented to prevent siltation into Arana Gulch that may result from future implementation of specific projects, consistent with Policy 5.7.3. Implementation of the proposed Watershed Enhancement Plan will reduce/minimize future erosion into Arana Gulch, and will not interfere with natural drainage patterns, consistent with Policy 5.7.6.

10. MINERAL RESOURCES

The proposed project is located in an urban, semi-forested area. The site is not within, adjacent to or near existing mining operations or known mineral resources.

11. NOISE

(a-d) Exposure to Noise. The proposed project consists of implementation of a watershed enhancement plan, and will not result in new development or generation of a permanent noise source. The project will result in short-term, temporary increases in noise levels due to specific repairs, most of which will be completed without use of heavy equipment. The project will not result in a permanent increase in noise levels once the riverwall has been completed.

(e-f) Airport Noise. See subsection 7 e-f above.

12. POPULATION AND HOUSING

The proposed project consists of implementation of a watershed enhancement plan, and will not result in new development or population growth and does not require the relocation of work staff to the community that could result in population increases.

13. PUBLIC SERVICES

The proposed project consists of implementation of a watershed enhancement plan, and will not result in new development, population growth or public service demand.

14. RECREATION

The proposed project consists of implementation of a watershed enhancement plan, and will not result in new development, population growth or public service demand.

15. TRANSPORTATION / TRAFFIC

(a-b) Traffic. The proposed project consists of implementation of a watershed enhancement plan, and will not result in new development, population growth or permanent increased traffic. Future implementation of recommended site-specific repairs could result in a localized, short-term temporary increase in traffic to the site related to construction equipment and workers.

(c) Air Traffic. The proposed project will have no effect on air traffic patterns (see subsection 7 e-f).

(d-g) Access and Parking. The proposed project will not result in new development that would require emergency access.

16. UTILITIES AND SERVICE SYSTEMS

The project consists of implementation of a watershed enhancement plan, and will not result in new development or new demands for utilities.

17. MANDATORY FINDINGS OF SIGNIFICANCE

(a) Environmental Degradation and Biological and Cultural Resource Impacts. The project will not result in significant biological impacts with implementation of proposed mitigation measures and Best Management Practices outlined in this Initial Study. Implementation of the proposed plan will enhance the habitat of the federally endangered steelhead. The project will

not have significant impacts on other special status species habitat areas or affect any rare or endangered plant. There will be no impacts to cultural resources.

(b) Cumulative Impacts. The project consists of retaining wall construction in order to repair an existing rural private road in order to protect a publicly owned and operated water line. The project will result in short-term, temporary impacts related to construction, but would not result in permanent impacts. There are no known cumulative projects or significant cumulative impacts to which the project would contribute.

(c) Adverse Environmental Effects. As evaluated in this Initial Study, the proposed project would either have no impact or less-than-significant impacts on human beings, either directly or indirectly. Short-term construction-related impacts will be minimized or avoided with implementation of proposed project construction specifications and mitigation measures outlined in this Initial Study.

SECTION 5. MITIGATION MONITORING AND BEST MANAGEMENT PRACTICES

Under State law, a mitigation monitoring program is required for all mitigation measures identified for significant impacts. This Initial Study identified potential significant impacts related to biologic resources and water quality as a result of future implementation of recommended site-specific repairs. These mitigation measures are identified below.

MITIGATION MEASURE 1: Adopt and implement “Best Management Practices” (BMPs) to require that any future repairs or work in the channel be conducted outside steelhead migration period and that the use of coffer dams and dewatering be implemented to maintain bypass flows and prevent erosion.

MITIGATION MEASURE 2: Adopt and implement “Best Management Practices” (BMPs) to require that if construction, including tree removal, is scheduled to begin between March and late July, a pre-construction nesting survey will be conducted by a qualified wildlife biologist to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors are found, construction may need to be delayed until late-August, or after the wildlife biologist has determined the nest is no longer in use.

MITIGATION MEASURE 3: Adopt and implement “Best Management Practices” (BMPs) to control erosion and require that all construction materials and fill be stored and contained in a designated area that is located away from channel areas to prevent inadvertent transport of materials into the adjacent stream channel. Prohibit fueling, cleaning or maintenance of equipment except in designated areas located as far from the creek as possible. As a precaution, require contractor to maintain adequate materials onsite for containment and clean-up of any spills.

Table 4 provides a listing of “Best Management Practices” (BMPs) that include the above mitigation measures and other measures to avoid or minimize impacts that may result during future site-specific project repairs. Best management practices (BMPs) are methods, measures, or practices that avoid, reduce or minimize a project’s effects on various resources. BMPs include, but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after activities to reduce or eliminate environmental impacts.

- **Staff or Agency Responsible for Implementation:** Santa Cruz County Resource Conservation District is responsible for including BMP table in the final adopted Watershed Enhancement Plan. District or AGWA staff are responsible for ensuring that the BMPs included in Table are incorporated into future work plans at recommended project sites, where and when appropriate.
- **Timing of Implementation:** To be included in future project plans and construction specifications.

TABLE 4 RECOMMENDED BEST MANAGEMENT PRACTICES FOR FUTURE REPAIR ACTIVITIES		
BMP	Title	Description
1. Water Quality--Implement measures to protect water quality, reduce short-term increases in turbidity, and maintain the geomorphic integrity of the channels during future in-channel repair projects.		
1	Dewater/ Bypass Water	If water is present at the work site, a temporary dam or other artificial dam will be constructed, as needed, to isolate the work area, and shall be constructed from materials such as clean river gravel or sandbags which will cause little or no siltation. Stream flow shall be diverted around the work area during construction operations with sufficient water allowed at all times to pass downstream to maintain aquatic life.
2	Erosion Control	All temporary diversion structures shall be removed. Flows shall be restored in a manner that minimizes erosion. Flows shall gradually be restored to the channel to avoid a surge of water that would cause erosion or scouring.
3	Erosion and Sediment Control Measures	Implement erosion control measures during and after construction to prevent inadvertent erosion and offsite transport of sediments into Arana Creek channels and tributaries, including, but not limited to: <ul style="list-style-type: none"> ▪ Install well-anchored silt at the outer edge of construction zones to contain any soil from the construction zone before it reaches creek channels; ▪ Limit ground disturbance and vegetation removal during construction; ▪ Adequate erosion and siltation control measures shall be used to prevent turbid or silt-laden water from entering the stream; ▪ All erosion controls shall be in place prior to commencement of work and shall be maintained for the duration of the project; ▪ Complete work prior to the onset of the rainy season (generally November 1); and ▪ After construction and prior to October 15, all disturbed soils at each site should undergo erosion control treatment consisting of temporary seeding, straw mulch or other measures pursuant to an approved erosion control plan.
4	Soil Stockpiles	If soil is to be stockpiled, no runoff will be allowed to flow back to creek outside of the work area in which water quality BMPs have been implemented.
5	Equipment Fueling	Fueling and maintenance of equipment shall not be conducted within 100 feet of the creek channel or riparian zone. An oil/toxic materials spill contingency plan will be prepared and shall identify the location of containment and abatement materials on site and the notification and cleanup procedures to be followed by the operator in the event of a spill. Any equipment operated within or adjacent to the stream shall be checked and maintained daily to prevent leaks.
2. Vegetation – Avoid or minimize riparian and/or wetland vegetation removal and revegetate sites as appropriate to provide erosion control and restore riparian habitat value.		
6	No Equipment in Channel	Vehicles and heavy equipment shall not be driven or operated in the wet or dry portions of a stream or where wetland or riparian vegetation or aquatic organisms may be destroyed.
7	Avoid or Minimize Vegetation	Require that any future repairs or work in areas of riparian and/or wetland habitat be conducted after consultation with a qualified biologist to ensure that removal of or impacts to riparian and wetland vegetation is minimized.

TABLE 4 RECOMMENDED BEST MANAGEMENT PRACTICES FOR FUTURE REPAIR ACTIVITIES		
BMP	Title	Description
	Removal	
8	Riparian Habitat Protection	The perimeter of the work site shall be adequately flagged/fenced to prevent damage to adjacent riparian habitat.
3. Wildlife and Fisheries -- Implement measures to minimize impacts to native species, especially special-status and riparian dependant species.		
9	Minimize Impacts to Special-status Plants and Animals Via Site Assessments and Avoidance Measures	To avoid and minimize impacts to special-status plant and wildlife species, require preparation of pre-construction surveys at any site where special status species have been found, have been known to exist in the recent past, or are likely to occur because suitable habitat exists, at least 30 days prior to the start of construction to determine presence of special-status species. If special status species are found, a qualified biologist will remove them to suitable habitat outside of the project limits. Moving animals will be consistent with applicable Fish and Wildlife Service and Fish and Game permits. The results of all sensitive species surveys will be reported to the Fish and Wildlife Service and the California Department of Fish and Game in an annual report. All surveys will be reported to the CNDDDB.
10	Conduct In-Channel Work During the Dry Season	Avoid impacts to steelhead by scheduling stream maintenance projects between August 1 and October 31, unless otherwise approved by the California Department of Fish and Game. Coordinate the timing and location of all repair activities with a fisheries biologist to insure that the area of disturbance will not adversely affect important fish and aquatic species habitat, such as riffles, pools and runs. Field check work sites for aquatic species prior to maintenance activities and devise plan for relocation if necessary.
11	Minimize Impacts to Breeding Species	a) If construction, including tree removal, is scheduled to begin between March and late July, a pre-construction nesting survey shall be conducted by a qualified wildlife biologist to determine if nesting birds are in the vicinity of the construction sites. If nesting raptors are found, construction may need to be delayed until late-August, or after the wildlife biologist has determined the nest is no longer in use. b) Require any scheduling of grading at Delaveaga (Project #14) outside of the Monarch butterfly overwintering period.
12	Minimize Effects of Bypass Structures on Steelhead	To prevent increases in temperature and decreases in dissolved oxygen (DO), if bypass pipes are used, they shall be properly sized (i.e., larger diameter pipes to better pass the flows). Bypass pipes may also be avoided by creating a low-flow channel or using other methods to isolate the work area.
4. Land Use and Public Safety -- Minimize disturbance to the public and ensure public safety.		
13	Minimize Disturbances to Neighborhoods	Implement maintenance practices that minimize disturbances to neighborhoods surrounding work sites. a) In general, work shall be conducted during normal working hours. Extending weekday hours and working weekends may be necessary to complete some

TABLE 4 RECOMMENDED BEST MANAGEMENT PRACTICES FOR FUTURE REPAIR ACTIVITIES		
BMP	Title	Description
		<p>projects.</p> <p>b) Internal combustion engines shall be equipped with adequate mufflers.</p> <p>c) Excessive idling of vehicles will be prohibited.</p> <p>d) Levee traffic shall be limited to a speed of 15 miles per hour.</p> <p>e) Access roads shall be watered as needed to control dust.</p> <p>f) Dry sediment shall be wetted down or covered as needed to control dust during transport.</p>
5. Air Quality-- Implement dust control measures at work sites to protect air quality and minimize effects on adjacent neighborhoods.		
14	Basic Dust Control Measures	<p>Implement Basic Control Measures at maintenance sites greater than 2.2 acres in size. Current measures stipulated by the MBUAPCD CEQA Guidelines include the following:</p> <p>a) Active maintenance areas shall be watered at least twice per day unless soils are already sufficiently moist to avoid dust.</p> <p>b) Trucks hauling sediments and other loose material shall be covered or shall maintain at least two feet of freeboard.</p> <p>c) Tailgates of trucks shall be sealed.</p> <p>d) Trucks shall be brushed down before leaving the maintenance site.</p> <p>e) Unpaved access roads and staging areas that are being used for the maintenance activity shall be watered three times daily, or non-toxic soil stabilizers shall be applied to control dust generation.</p> <p>f) Paved maintenance site access roads shall be swept when visible soil material is carried onto the roadway.</p>
6. Cultural Resources -- Protect cultural resources.		
15	Discovery of Cultural Remains or Historical Artifacts – previously improved channels	<p>If archaeological resources or human remains are accidentally discovered during construction, work shall be halted within 50 meters (150 feet) of the find until it can be evaluated by a qualified professional archaeologist. If the find is determined to be significant, appropriate mitigation measures shall be formulated and implemented.</p>

SECTION 6. REFERENCES

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APPENDIX A

Biotic Resources Data

Table ES-1. Classification System for Primary and Secondary Habitat Types, Special Status Wildlife Species Habitat, and Invasive, Non-native Plant Species

Habitat Features Recorded for Management Plan			
Primary Habitat Type	Secondary Habitat Type	Special Status Wildlife Species and Habitat	Invasive, Non-Native Plant Species
Herbaceous Riparian and Wetlands	Seasonal Wetlands	Steelhead	Periwinkle
	Freshwater Marsh	Tidewater Goby	Ivy (Cape, English or Algerian)
	Salt or Brackish Water Marsh	Raptors (nesting)	Acacia
	Seeps and Springs	Monarch Butterfly (over-wintering habitat)	Broom (Spanish, French or Portuguese)
	Wet Meadows	California Red-legged Frog	Poison Hemlock
Mixed Riparian Woodland	Willow-dominated	Southwestern Pond Turtle	Cotoneaster
	Willow and Alder - dominated	Tri-colored Blackbird (nesting)	Himalaya Berry
	Box Elder and Maple-dominated	Yellow Warbler (nesting)	Eucalyptus
	Willow and Freshwater Marsh		Monterey Pine
	Sycamore-dominated		Giant Reed
Oak Riparian Woodland	Coast Live Oak and Willow-dominated		Thistles (Bull, Canada, Italian)
	Redwood-dominated		Pampas Grass
Non-native Riparian Woodland	Eucalyptus-dominated		Monterey Cypress
	Pine-dominated		
	Acacia-dominated		
	Other Landscape Plants dominant		
Modified Channels	Earthen Channel		
	Concrete-lined Ditch		
	Storm Drain		
	Other Channel Type		
Open Water	Pond or Lake		
	Coastal Lagoon		
Riparian Scrub	Blackberry, Rose and Poison Oak-dominated		
	Willow, Sedge and Blackberry-dominated		
	Coyote Brush, Poison Oak and Coffee Berry-dominated		

Table 2-2. Special Status Plant Species with the Potential to Occur in the Vicinity of Watercourses and Wetlands

Species	CNPS Status	State Status	Federal Status	Habitat Affinity and Known Occurrences within City or County	Known or Potential Occurrence Within City Watercourses or Wetlands
Blasdale's bentgrass (<i>Agrostis blasdalei</i>)	List 1B	None	None	Upland Grassland Known from Swanton Road and Highway	Unlikely
Robust spineflower (<i>Chorizanthe robusta</i> var. <i>robusta</i>)	List 1B	None	Endangered	Upland Grassland Known from Pogonip	Unlikely
San Francisco popcorn flower (<i>Plagiobothrys diffusus</i>)	List 1B	Endangered	Species of Special Concern	Mesic Grassland Known from Moore Creek Preserve and other areas near Meder Street	Yes; potential to occur in or near seasonal wetlands that occur in grasslands
Santa Cruz Clover (<i>Trifolium buckwestiorum</i>)	List 1B	None	None	Margins of upland forest and grasslands Known from Swanton area and Soquel	Yes; potential to occur in mesic grasslands adjacent to oak riparian woodlands and in seasonal wetlands
Santa Cruz tarplant (<i>Holocarpha macradenia</i>)	List 1B	Endangered	Threatened	Upland Grassland Known from Arana Gulch Greenbelt, Schwan Lagoon area and Soquel	Unlikely
Kellogg's horkelia (<i>Horkelia cuneata</i> ssp. <i>sericea</i>)	List 1B	None	Species of Special Concern	Coastal scrub and pine forests	Unlikely
Small-leaved lomatium (<i>Lomatium parviflorum</i>)	List 4	None	None	Oak woodland forest Known from Aptos area	Unlikely
Santa Cruz microseris (<i>Microseris decipiens</i>)	List 4	None	Species of Special Concern	Areas of loose soil in upland forest and grasslands Known from Swanton area, Scotts Creek and Mill Creek	Unlikely
Gairdner's yampah (<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>)	List 4	None	Species of Special Concern	Margins of upland forest and grasslands Known from Soquel	Unlikely
Michael's piperia (<i>Piperia michaelii</i>)	List 1B	None	Species of Special Concern	Areas of loose soil in coastal scrub and bluff scrub Known from Scotts Creek	Unlikely
Maple-leaved checkerbloom (<i>Sidalcea malachroides</i>)	List 1B	None	None	Oak woodland and mixed forests Last record in County from 1932	Unlikely
San Francisco campion (<i>Silene verecunda</i> ssp. <i>verecunda</i>)	List 1B	None	Species of Special Concern	Coastal scrub and grasslands Known from Swanton area	Unlikely

Source: CDFG Rarefind, 2001; Biotic Resources Group, 2001

CNPS Status:

List 1B: These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDF&G Code.

List 3: This is a review list of plants which lack sufficient data to assign them to another list.

List 4: List 4 is a watch list of plants with limited distribution in the State that have low vulnerability and threat at this time. These plants are uncommon, often significant locally, and should be monitored.

Table 2.3. Special Status Wildlife Species and Their Potential to Occur in Watercourses and Wetlands

SPECIES	STATUS ¹	HABITAT	KNOWN OCCURRENCE WITHIN CITY WATERCOURSES OR WETLANDS	POTENTIAL OCCURRENCE WITHIN CITY WATERCOURSES OR WETLANDS
Invertebrates				
Monarch butterfly <i>Danaus plexippus</i>	•	Winter roosts in eucalyptus and pine groves protected from wind.	Known roosts at Natural Bridges, Moore Creek just north of Hwy 1, upper Arroyo Seco Creek, lower end of Pilkington Gulch, Pogonip Creek near Evergreen Cemetery and lower Branciforte Creek.	Likely in non-native riparian woodlands that are dominated by eucalyptus. Potential habitat in some upper portions of Carbonera, Branciforte and Hagemann Creeks, and several portions of Arana Creek.
Fish				
Tidewater goby <i>Eucyclogobius newberryi</i>	FE, CSC	Coastal lagoons and up to one mile upstream.	Known to occur in Moore Creek from mouth to 0.25 mi upstream and Arana Creek from mouth to one mile upstream.	Potential in Younger Lagoon (UCSC lands) and mouth of Moore Creek (Natural Bridges State Beach).
Steelhead <i>Oncorhynchus mykiss</i>	FT	Creeks, rivers and their tributaries.	Known to occur in San Lorenzo River, Branciforte Creek and Arana Creek.	No other watercourses in the City are potential habitat for this species.
Coho Salmon <i>Salmo gairdneri</i>	FT, SE	Creeks, rivers and their tributaries.	Historically known from San Lorenzo River; not known since 1977 drought.	Potential re-colonization of San Lorenzo River; no other watercourses in the City are potential habitat for this species.
Amphibians				
California red-legged frog <i>Rana aurora draytonii</i>	FT, CSC	Riparian woodland, marshes, estuaries and ponds.	Known to occur in Antonelli Pond, Moore Creek, marsh at Natural Bridges, Younger Lagoon and ponds near UCSC arboretum (tributary to Moore Creek, just outside City limits).	No other watercourses in the City are known to support this species.
Reptiles				
Southwestern pond turtle <i>Clemmys marmorata pallida</i>	FSC, CSC	Creeks and ponds.	Known to occur in Moore Creek, Antonelli Pond, marsh at Natural Bridges and Neary Lagoon; historic occurrence in Westlake Pond.	No other watercourses or wetlands in the City are potential habitat for this species.
Birds				
White-tailed kite <i>Elanus leucurus</i>	FPS	Oak woodland and riparian woodland.	Known to nest in Natural Bridges.	Potential habitat along portions of Moore Creek.
Cooper's hawk <i>Accipiter cooperii</i>	CSC	Oak woodland and riparian woodland.	Known to nest along Moore Creek.	Potential nesting habitat occurs along upper portions of Arroyo Seco Creek and Arana Creek.
Yellow warbler <i>Dendroica petechia brewsteri</i>	CSC	Nests in riparian habitats with dense willows and cottonwoods.	Formerly bred at Antonelli Pond, San Lorenzo River (Sycamore Grove), Carbonera Creek, Branciforte Creek, Westlake Pond, Neary Lagoon and Arana Creek; not currently known to nest in City.	Potential nesting habitat at Antonelli Pond, San Lorenzo River (Sycamore Grove), Carbonera Creek, Branciforte Creek, Neary Lagoon and Arana Creek.
Yellow-breasted chat <i>Icteria virens</i>	CSC	Nests in riparian habitats with dense willows, cottonwoods.	Probably extirpated as breeder in County; more data needed to determine current nesting status in the City.	Potential nesting habitat at Antonelli Pond, San Lorenzo River (Sycamore Grove), Carbonera Creek, Branciforte Creek, Neary Lagoon and Arana Creek.

Table 2.3. Special Status Wildlife Species and Their Potential to Occur in Watercourses and Wetlands (continued)

SPECIES	STATUS ¹	HABITAT	KNOWN OCCURRENCE WITHIN CITY WATERCOURSES OR WETLANDS	POTENTIAL OCCURRENCE WITHIN CITY WATERCOURSES OR WETLANDS
Tricolored blackbird <i>Agelaius tricolor</i>	CSC	Nests in freshwater marshes with dense tules and cattails.	Historically nested at Antonelli Pond and Neary Lagoon.	Potential nesting habitat at Antonelli Pond and Neary Lagoon.
Mammals				
Yuma myotis <i>Myotis yumanensis</i>	FSC, CSC	Open forests and woodlands with water nearby; roosts in buildings, caves and crevices.	No survey data for City available.	Potential habitat along Moore Creek, portions of San Lorenzo River, upper portions of Branciforte, Carbonera and Arana creeks.
Townsend's western big-eared bat <i>Corynorhinus townsendii townsendii</i>	FSC, CSC	Wide variety of habitats; roosts in caves, tunnels, mines, and buildings.	No survey data for City available.	Potential habitat along Moore Creek, portions of San Lorenzo River, upper portions of Branciforte, Carbonera and Arana creeks.
San Francisco dusky-footed woodrat <i>Neotoma fuscipes annectens</i>	FSC, CSC	Riparian and oak woodlands.	No survey data for City available.	Potential habitat along Moore Creek, Arroyo Seco, upper portions of San Lorenzo River, upper portions of Branciforte, Carbonera and Arana creeks.

Sources: CDFG Rarefind, 2001; Dana Bland & Associates, 2001; Dr. Jerry Smith, 2000 and 2001; Santa Cruz Bird Club, 2001

¹ Key to status:

FE	=	Federally listed as endangered species
FT	=	Federally listed as threatened species
FSC	=	Federal species of special concern
FPS	=	State designated Fully Protected Species
CSC	=	California species of special concern
*	=	Locally unique species in City of Santa Cruz General Plan and LCP
ST	=	State listed as threatened
SE	=	State listed as endangered species

APPENDIX B

Site-Specific Project Data

APPENDIX B – PROPOSED PROJECTS

The Arana Gulch Assessment and Enhancement Plan includes information and analysis intended for application at the watershed scale and for the general planning purpose described in the plan. The Plan recommendations are for general planning purposes only, to phase and fund work in a logical progression. Further analysis, design, potential additional environmental review, and permits will follow on a site-specific basis as implementation plans are advanced.

The following pages presents specific project descriptions, repair plans and illustrations as developed to date, and site photos. The project descriptions and site plans are intended for conceptual discussion.

SITE 1 – BLUE TRAIL DAM

Location: East Branch of Arana Gulch, located on private property north of Katherine Street

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade)

APN: 102-48-01

Problem: Right bank below the existing dam is experiencing accelerated erosion and could compromise the dam structure, leading to potential release of large volumes of sediment in event of dam failure, estimated at 2,000 cubic yards. Site 1 is a sediment source on the eastern branch, attributed to channel bank failures. When bank failures occur at this site, sediment is directly added to the channel and thus immediately available for transport.

Proposal: Place approximately 75 sandbags (4-5 shovels fill each, ~2 cubic yards), totaling approximately 150 cubic yards, adjacent to dam in an area of approximately 12 feet long, 3 feet wide, and 9 feet deep. The relative merits of repair, removal, or conversion of the dam and reservoir at the head of the Blue Trail require further review. In mid-January 2002, it was found that a wooden plug at the base of the dam has failed, and that sediment is entering Arana Gulch largely unrestricted. Two alders within the sedimented pond have fallen. At the time, an estimated 90% of the sediment originally stored behind the dam was reported to remain in place leaving a large volume of sediment (potentially 2000 cubic yards) available for transport to downstream reaches. Breach of the dam was discovered approximately two weeks prior to production of the final Watershed Enhancement Plan. Information available at present is not sufficient to prepare a recommended treatment approach for this sediment source. At the moment, we assume that the plug will be repaired, and that repair of the dam face, as described below, is the most likely near-future action which may be followed. At some later date, however, a more complete assessment of alternatives should be developed.

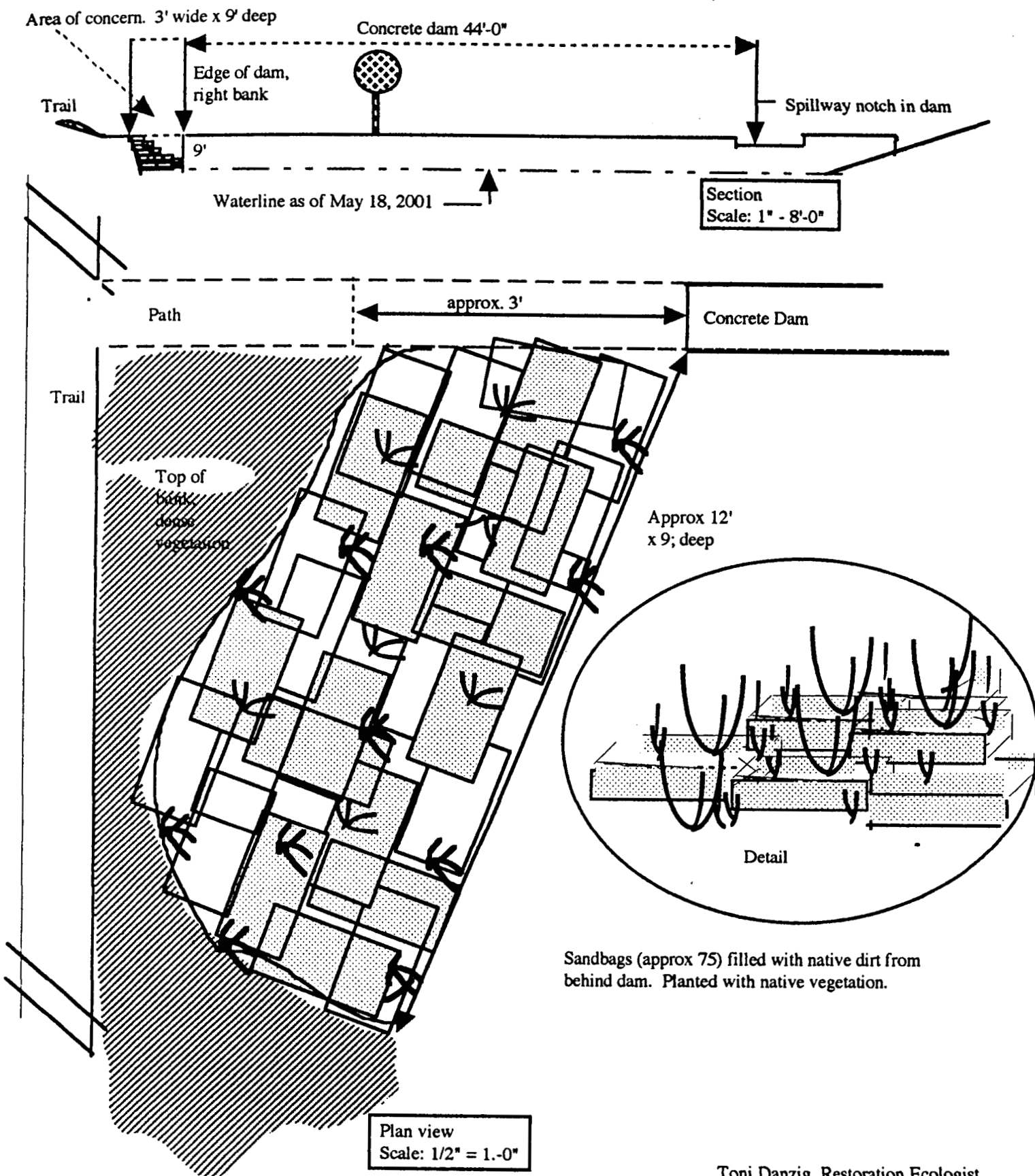
Purpose: A treated sandbag spillway is recommended to protect the bank from further erosion. Armoring the bank will protect dam structure as prevention measure to avoid release of large volume of sediment if dam fails (estimated as approximately 2,000 cubic yards). A treated sandbag spillway will serve to stabilize the bank and dissipate energy from runoff over the bank. (See discussion above.)

Construction Methods: Sandbags will be filled with native dirt from behind the dam, and planted with native vegetation gathered locally. Filling sandbags will require 2 cubic yards of soil. Repairs must be done without vehicular access, volunteer crew will be needed using hand carts and tools. Care will be taken in removing native vegetation and replanting it on site.

The remote nature of Site 1 provides the most difficulty in implementing repairs. Present access to the site by vehicles is not feasible. At best, walking time to Site 1 from an access point in the Santa Cruz Gardens neighborhood is 25 minutes. The lack of roads means that all work will have to be completed with hand tools and all materials brought in by backpack and wheelbarrow.

Potential Impacts: The site is adjacent to riparian habitat; excavation for sandbags could disrupt riparian vegetation. Prior to work, define soil excavation area outside riparian habitat. As with all sites, arrangements with property owners should recognize their need to limit liabilities while also enabling restoration activities.

Figure 7.1 Site 1: Blue Trail Dam - repair approach



Toni Danzig, Restoration Ecologist
July 1, 2001



Site 1 – Blue Trail Dam

SITE 2 – RIGHT BANK, BLUE TRAIL DAM

Location: East Branch of Arana Gulch, located on private property north of Katherine Street

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade) **APN:** 102-481-01

Problem: Bank failures and subsequent erosion due to stream undercutting during high flows. Site 2 is a sediment source on the eastern branch, attributed to channel bank failures. Site 2 is a series of right-bank failures found at the apex of meander loops. When bank failures occur at this site, sediment is directly added to the channel and thus immediately available for transport.

Proposal: Install log cribbing, suitably keyed to banks; backfill with native soils from behind dam; revegetate behind cribbing with alders and native riparian species.

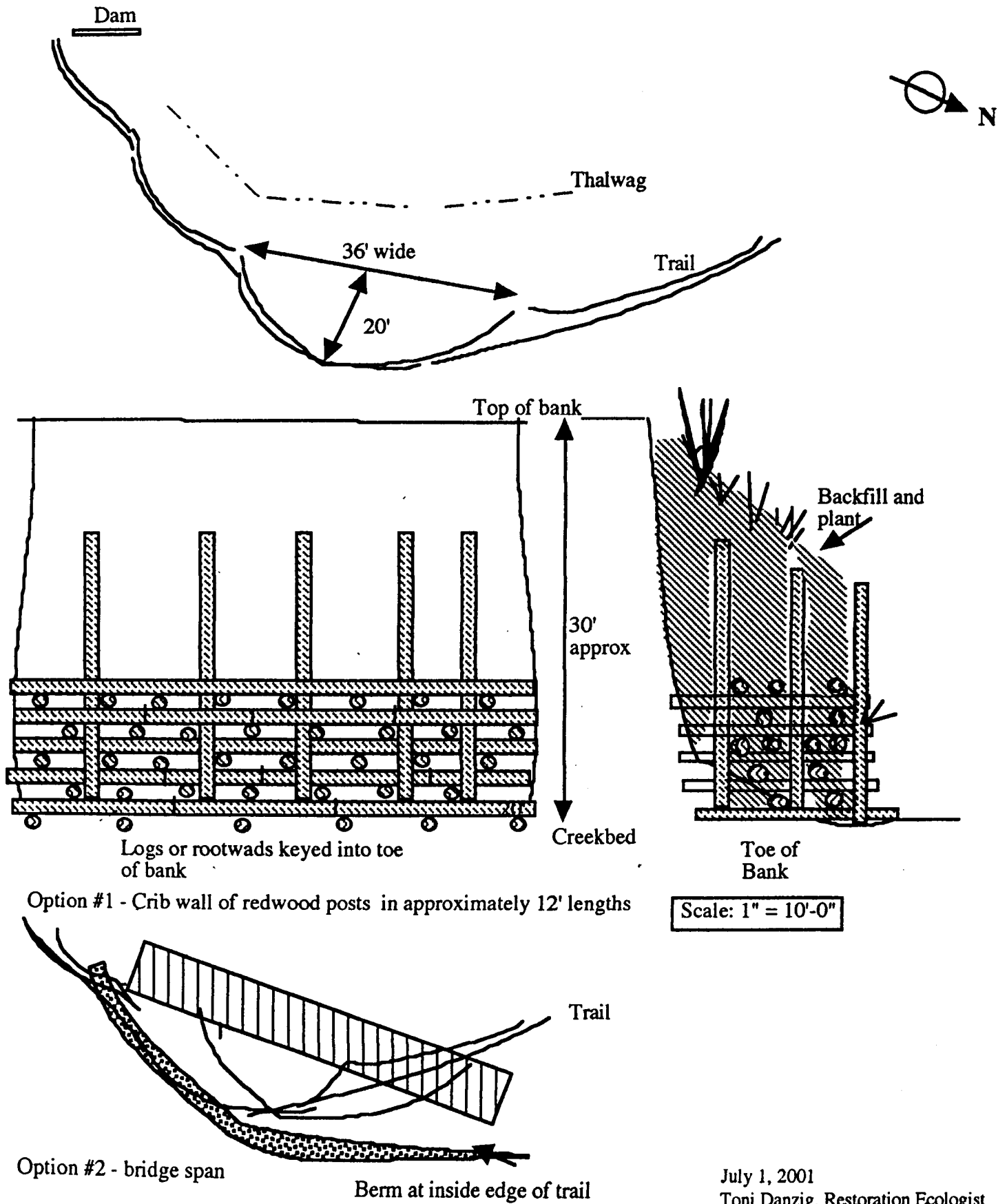
- Site 2A: Log cribbing approximately 36 feet long with backfill area totaling approximately 600 square feet and 600 cubic yards of material.
- Site 2b: Log cribbing approximately 17 feet long with backfill area totaling approximately 150 square feet and 40 cubic yards of material.

Purpose: Stabilize banks to decrease available sediment and avoid continued undercutting and protect foot trail. Site 2: Right-bank meanders below the Blue Trail Dam (2 locations). As with Site 1, the remote nature of Site 2 provides the most difficulty in implementing repairs. Log cribbing and plantings will stabilize the banks and do not require heavy equipment.

Construction Methods: Some materials will have to be imported. Great care will be taken to prevent impacts to adjacent slopes and vegetation. All work, including transport of materials to be done with hand crews. No motorized vehicles will be used. The remote nature of Site 2 pose the biggest problem in terms of implementing repairs. At best, walking time to Site 2 from an access point in the Santa Cruz Gardens neighborhood is 20 minutes respectively. The lack of roads means that all work will have to be completed with hand tools and all materials brought in by backpack and wheelbarrow. As with all sites, arrangements with property owners should recognize their need to limit liabilities while also enabling restoration activities.

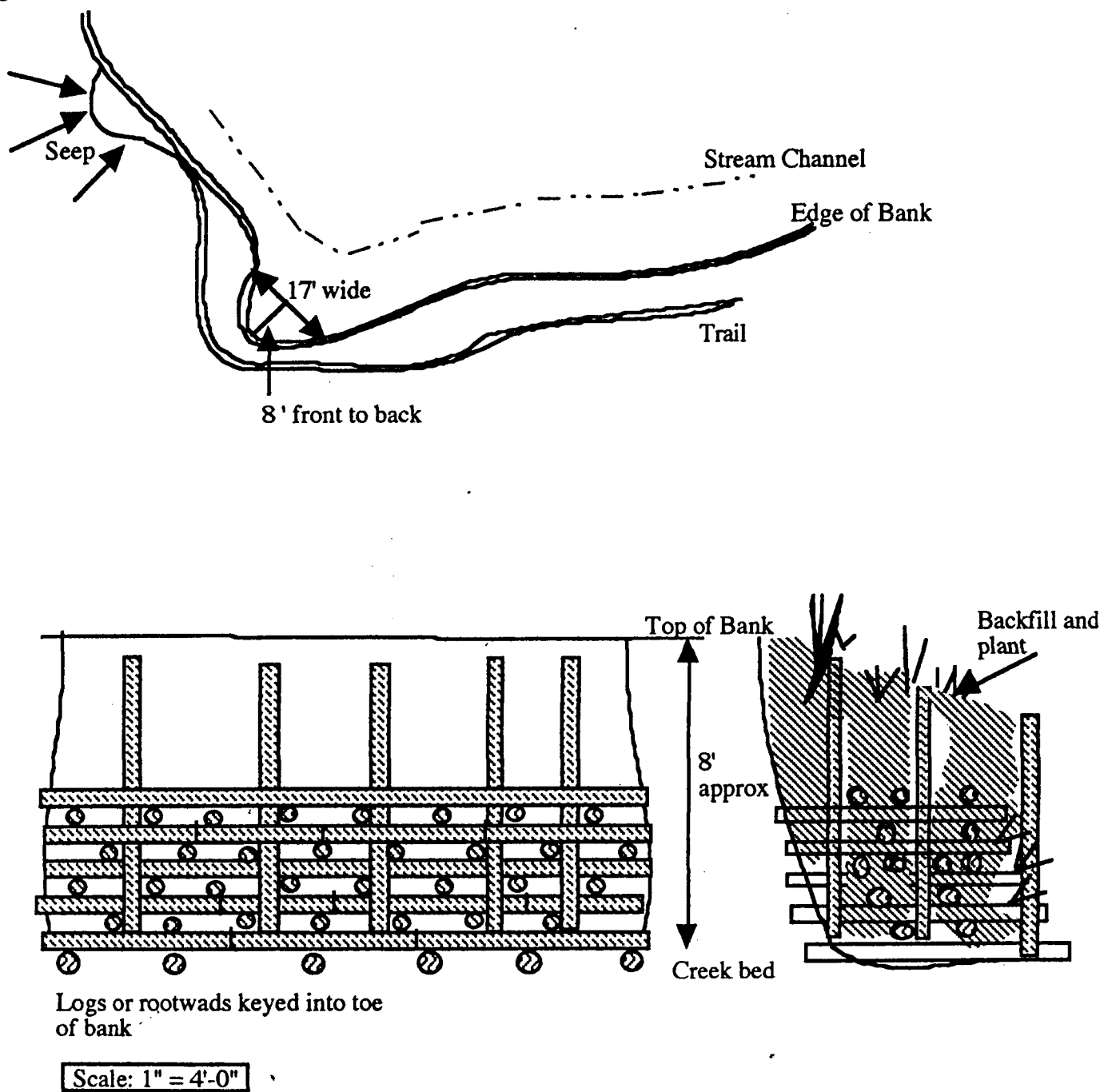
Potential Impacts: Potential fill of wetlands; removal riparian vegetation due to cribbing and excavation for backfilling; tree removal for cribbing materials; and construction access issues if materials are imported to the site. As with all sites, arrangements with property owners should recognize their need to limit liabilities while also enabling restoration activities.

Fig. 7.2 Site 2: Right Bank Meander Below Blue Trail Dam - repair approach

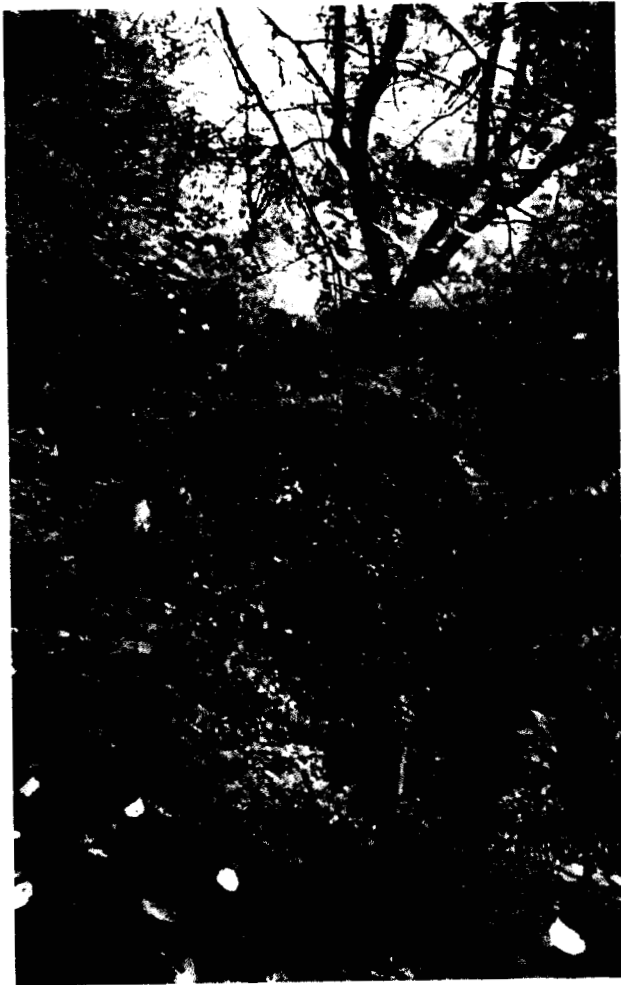


July 1, 2001
Toni Danzig, Restoration Ecologist

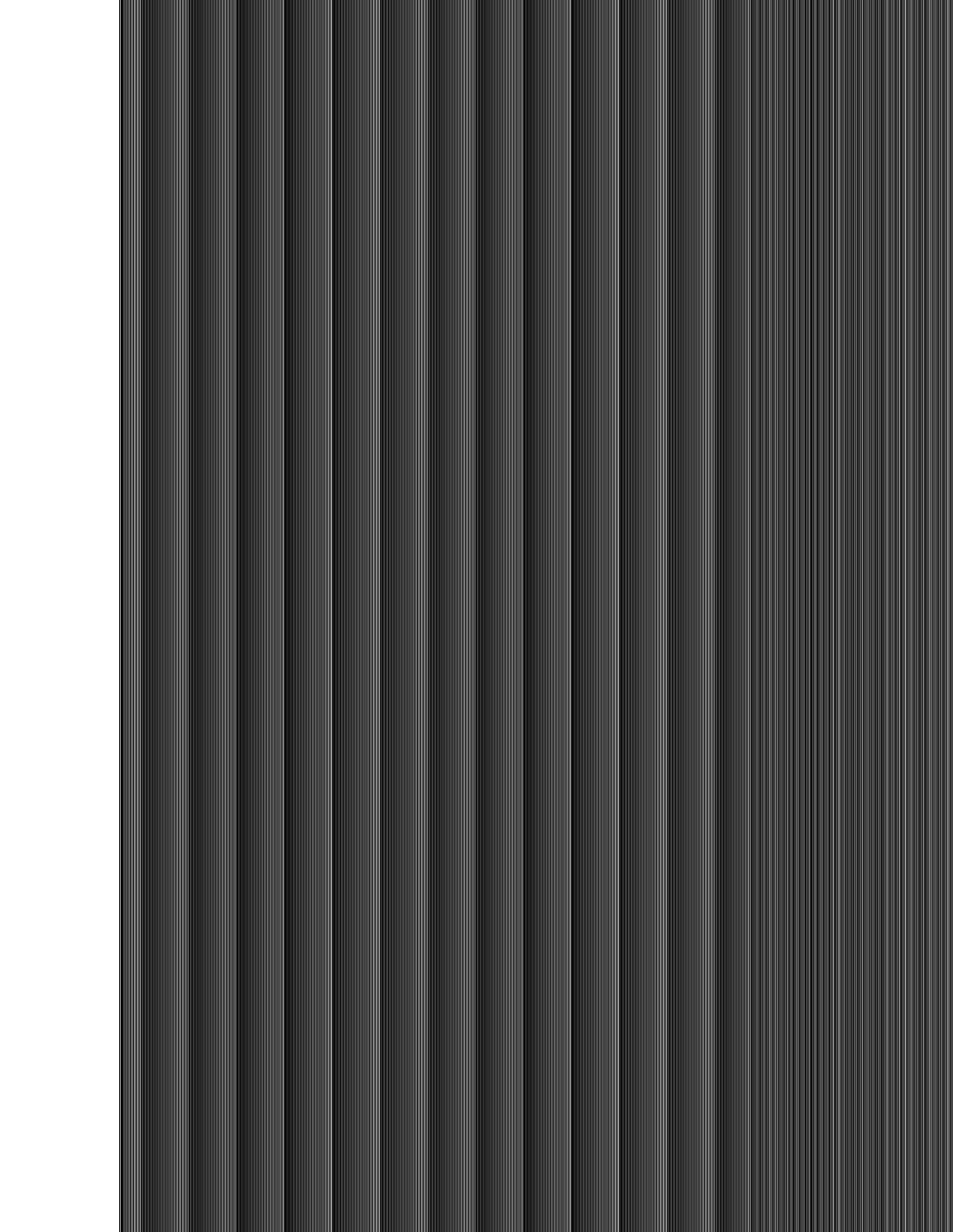
Figure 7.3 Site 2: Right bank meander failures below Blue Trail Dam - repair approach



July 1, 2001
Toni Danzig, Restoration Ecologist



Site 2





Site 2

SITE 3 – BLUE TRAIL GULLIES

Location: East Branch of Arana Gulch, located on private property north of Katherine Street

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade); City of Santa Cruz Water Department easement, PG&E power line pass overhead

APN: 102-481-01

Problem: Several large gullies are contributing large amounts of sediment to channel and have compromised recharge area, groundwater aquifer, City water line and Blue Trail. Site 3 is a large source of sediment in the eastern branch, which is attributed to accelerated gully expansion in the hillslope on the eastern side of the valley above the Blue Trail footbridge. These gullies are directly linked to the channel by a small drainage collecting water and sediment at the base of the gullies. Gully head cutting and lateral growth are threatening to washout part of the Blue Trail and a city water line. The City of Santa Cruz has recently taken steps to stabilize the public water line that cuts across the upper portion of the gullies.

Proposal: The general approach to stabilizing the Blue Trail gullies is to enhance the natural drainage of the area, backfill the gullies and plant with aggressive, fast growth native species. Specific steps would include a)filling the bottom of each gully with several inches of coarse gravels, b)lay perforated piping over the coarse gravel for the full length of each gully, and c)follow this with burial of the piping with several more inches of coarse gravel. Additional anchoring of the perforated piping may be needed. The remainder volume of each gully with non-engineered soils and aggressively planted with fast growing native species. Additional stabilization of the area with root wad cuttings or something similar may also be warranted until planted vegetation matures.

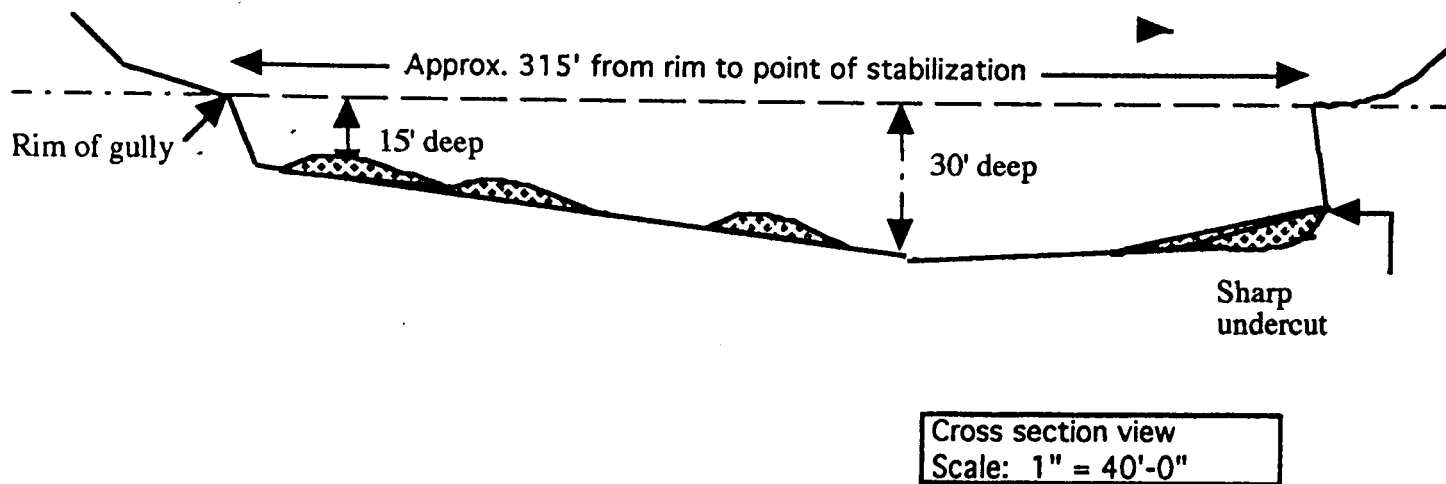
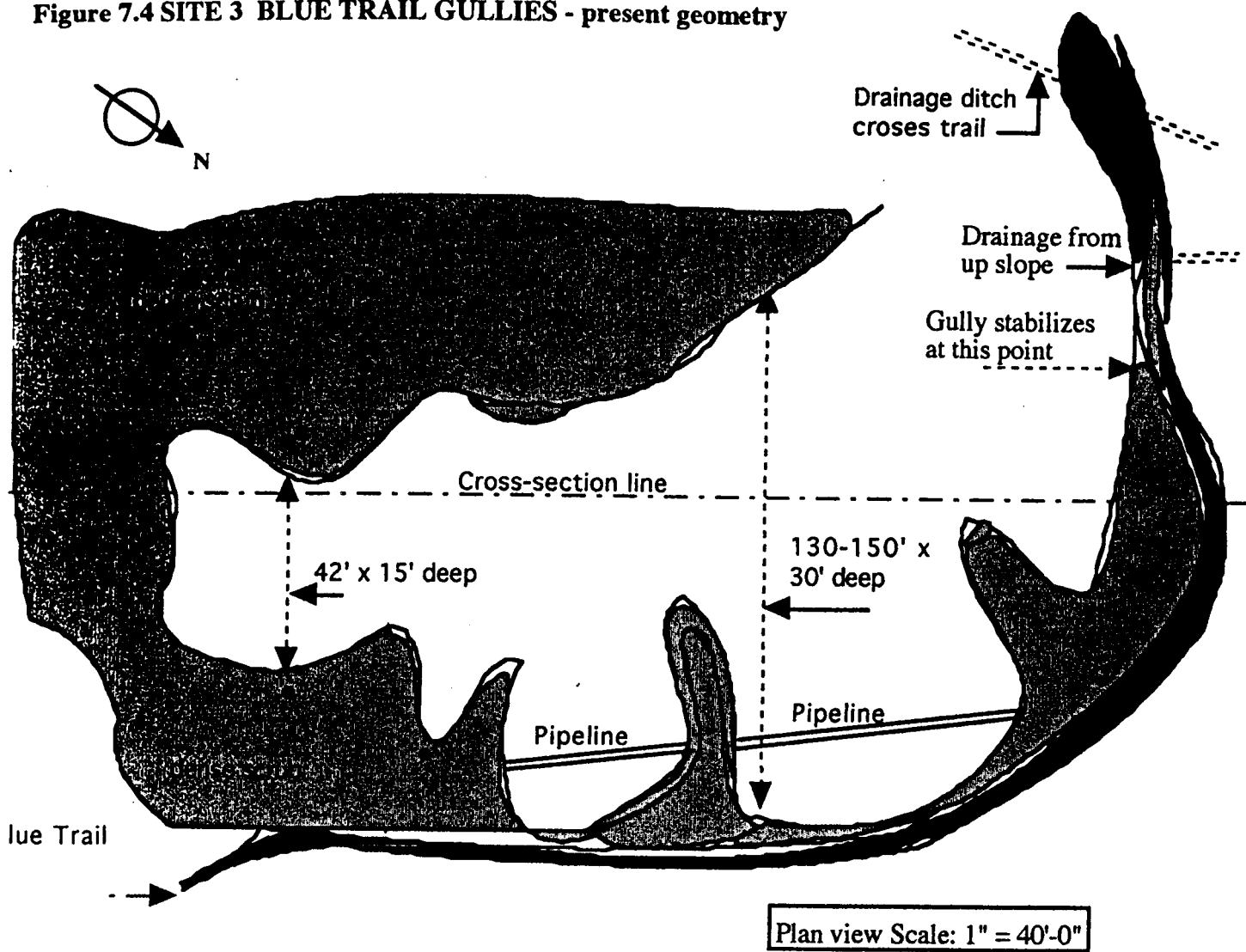
Purpose: Halt further head cutting of gullies, repair eroded area; restabilize hillslopes, reduce the continuing sediment contribution to system throughout the reach, protect City of Santa Cruz water line, mantel for groundwater aquifer recharge and the private property Blue Trail.

Construction Methods: Within an approximately 26,000 square foot area, lay 500 feet of perforated pipeline over coarse gravel for the full length of each of three gullies and cover with several more inches of coarse gravel; backfill gullies with non-engineered soil and aggressively revegetate. Material will be delivered by sliding it down to the site from a temporary ramp constructed up on the flat service road above the gully site. All spreading of materials will be by hand crews.

Site 3 is easily accessed by foot (in roughly five minutes) from the Santa Cruz Gardens neighborhood. A non-maintained road along the ridge could be used to transport materials to within several hundred feet of the site. Due to the proximity of Site 3 to the City water line, it might be possible to implement a joint effort by AGWA, the landowner (Chaminade) and the City of Santa Cruz with the goal of restoring the hillslope to more natural conditions.

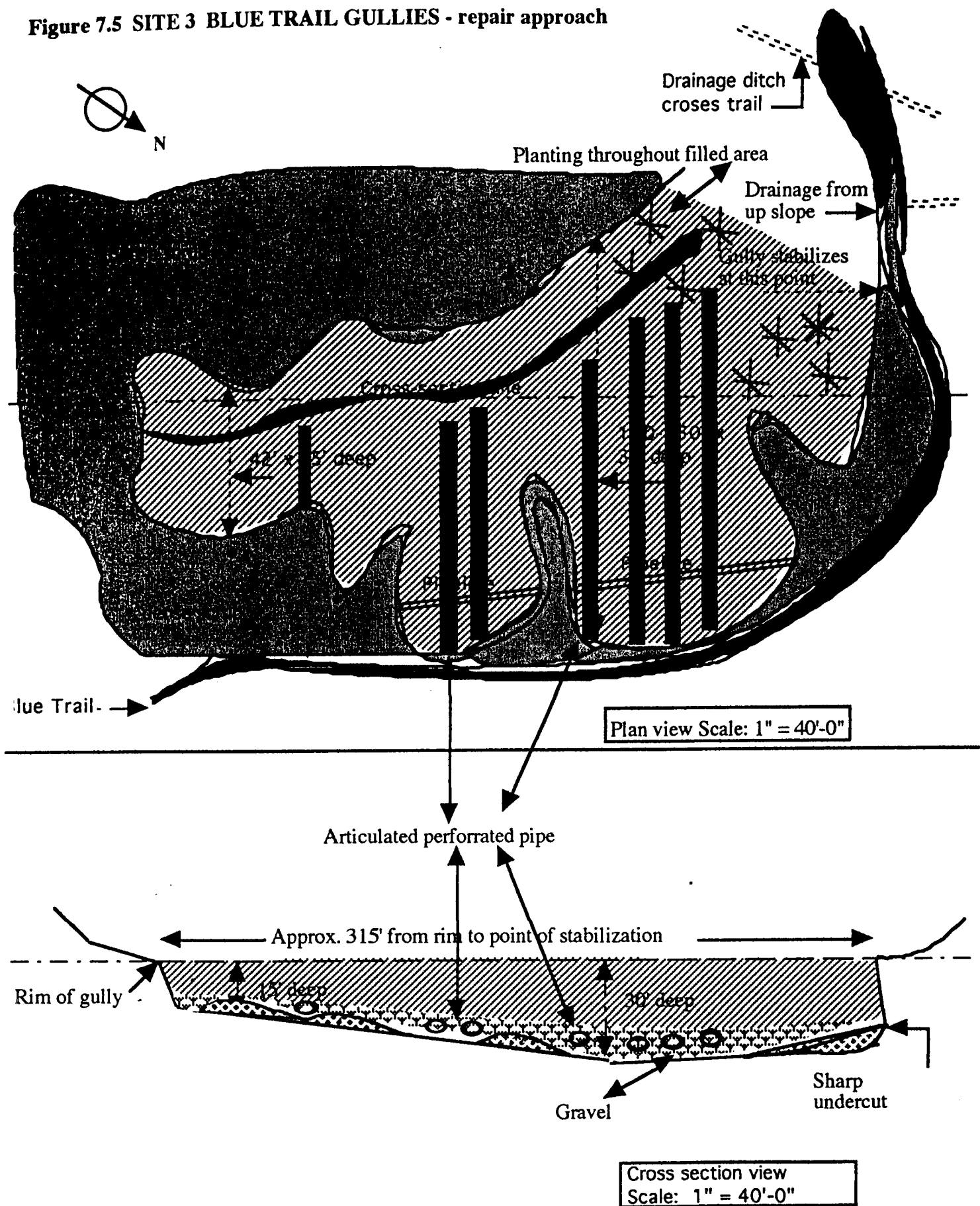
Potential Impacts: Does not appear to be wetland/riparian vegetation at the site that would be disturbed, but this needs checking. Potential disruption to nesting birds, and construction access issues with importation of gravels and materials. As with all sites, arrangements with property owners should recognize their need to limit liabilities while also enabling restoration activities.

Figure 7.4 SITE 3 BLUE TRAIL GULLIES - present geometry



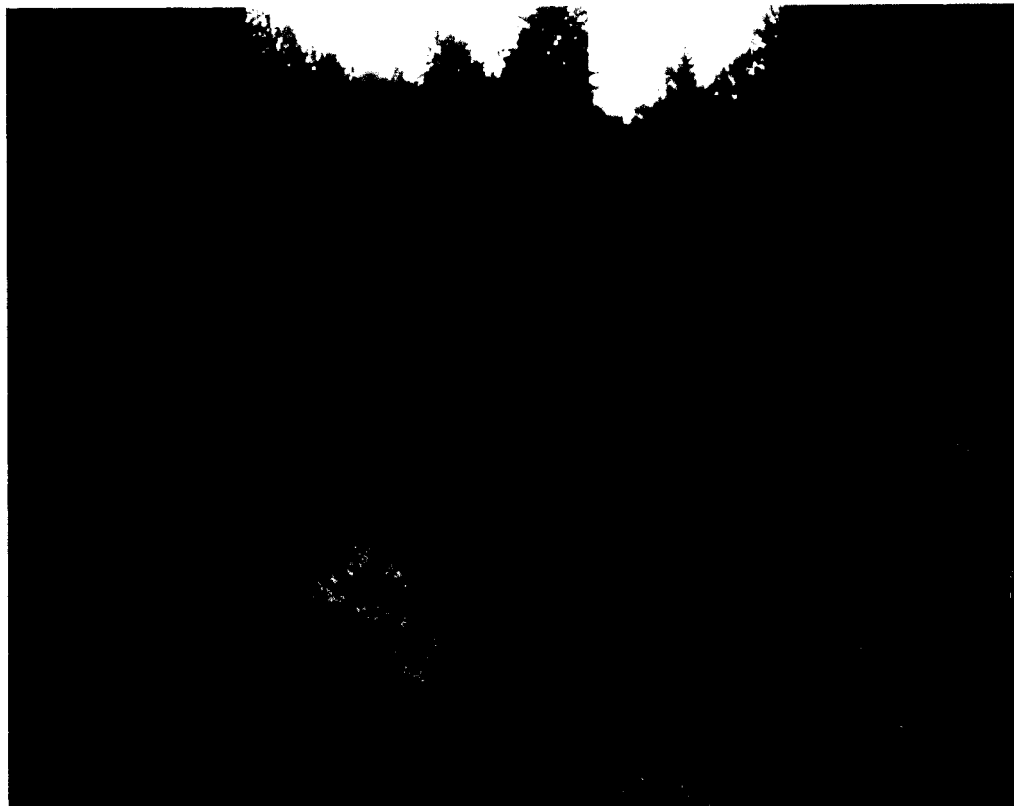
Toni Danzig, Restoration Ecologist
July 1, 2001

Figure 7.5 SITE 3 BLUE TRAIL GULLIES - repair approach





Site 3 – Looking at City of Santa Cruz Water Department pipeline



SITES 4 – STEELHEAD MIGRATIONAL BARRIER (B5)

Location: East Branch of Arana Gulch, located site 4 is 50 feet upstream of site 5, GPS coordinates N37 00.491': W121 58.787'.

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade)

APN: 102-061-08

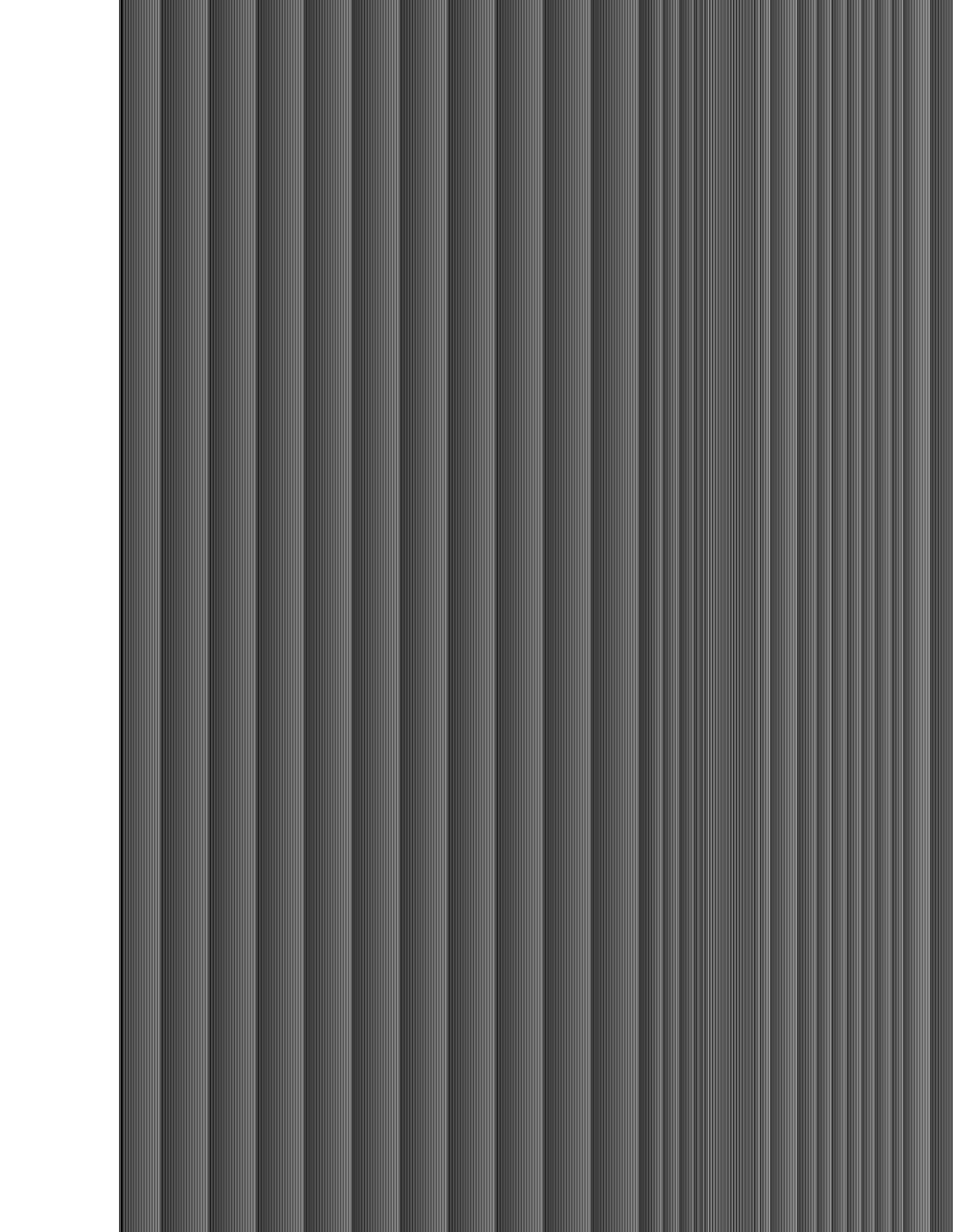
Problem: Two four-foot diameter culverts logged in the middle of the channel are jammed at the upstream end, creating a 4-foot drop without a jump pool, impassable barrier to adult steelhead.

Proposal: Hand crew removal of sediment and woody debris blocking upstream end. Removal of materials deposited inside culverts, use hand tools to lever and ropes to remove culverts from stream under supervision of fish biologist. Once removed from stream, culverts could be carried out for disposal or buried in forest.

Purpose: Allow for fish passage to the upstream reaches on the eastern branch by removing steelhead migration barrier and stabilizing downstream banks.

Construction Methods: Hand removal by volunteers under the direction of professional fish biologist. A chain saw to reduce material to manageable sizes. Care will be taken in material removal, material carried several hundred feet away from channel and deposited in forest to decompose naturally. Restore any disturbed areas with native soils, mulch, and endemic plantings as necessary. Site 4 is complicated by the presence of two culverts in the channel. A larger volunteer team might be necessary for this site. Material that is jammed upstream of the culverts should be removed in a manner similar to that discussed above. Material (sediment and woody debris) that has been deposited in the culverts could be removed with flat shovels and the culverts then lifted out the channel by the volunteer team. It might be necessary to lever the culverts from the bed so appropriate materials should be considered. Once the culverts are removed, they should be carried out and trucked away.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.



SITE 5 – STEELHEAD MIGRATIONAL BARRIER (B4)

Location: East Branch of Arana Gulch, located 90 feet upstream of Site 6

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade) **APN:** 102-061-08

Problem: Redwood logjam roughly seven feet in height at time of fisheries survey preventing fish passage.

Proposal: Under supervision of Calif. State Fish and Game, modify logjam using hand crew.

Purpose: Allow for fish passage to upstream reaches on the eastern branch of Arana Gulch and stabilize banks on either side of logjam.

Construction Methods: Under direction of fisheries biologist determine what of the large woody debris in the log jam actually affords habitat value and leave in place or re-position. Alternatives for the rest of the wood: 1) re-use as streambank armoring at the site; 2) place on site but removed from bank-full area where it could re-enter the system; 3) Remove by truck and stockpile for use elsewhere. Property owner's approval for any and all activities is required.

In conjunction with a fisheries biologist, a small volunteer team could effectively clear woody material causing passage problems at Sites 5 and 6. A chain saw would likely provide all the power necessary to reduce material to manageable sizes. The fisheries biologist would guide the volunteers as to which material should be removed and which material/structures should remain because of habitat value. Removed material could be carried several hundred feet away from the channel and deposited in the forest where it would be left to natural decomposition processes.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.

SITE 6 – STEELHEAD MIGRATIONAL BARRIER (B3)

Location: East Branch of Arana Gulch, located approximately 0.37 mi. upstream from Paul Sweet Road crossing.

Jurisdiction: County of Santa Cruz

Ownership: Private (Chaminade)

APN: 102-061-08

Problem: Log jam anchored by large redwood rootwad and concrete structure in left bank. Barrier might be passable at 20-30 cfs.

Proposal: Under supervision of State Fish and Game, modify logjam using hand crew.

Purpose: Allow for fish passage to upstream reaches on the eastern branch of Arana Gulch and stabilize downstream banks on either side of logjam as well as downstream if undercut.

Construction Methods: Manual removal of jam and culverts with a volunteer team of 5-6 people, under direction of fisheries biologist to determine what of the large woody debris in the log jam actually affords habitat value and leave it in place or re-position. Alternatives for the rest of the wood: 1) re-use as streambank armoring at the site; 2) place on site but removed from bank-full area where it could re-enter the system; 3) Remove by truck and stockpile for use elsewhere. Property owner's approval for any and all activities is required.

In conjunction with a fisheries biologist, a small volunteer team could effectively clear woody material causing passage problems at Sites 5 and 6. A chain saw would likely provide all the power necessary to reduce material to manageable sizes. The fisheries biologist would guide the volunteers as to which material should be removed and which material/structures should remain because of habitat value. Removed material could be carried several hundred feet away from the channel and deposited in the forest where it would be left to natural decomposition processes.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.

SITE 7 – CULVERT BENEATH PAUL SWEET ROAD

Location: East Branch of Arana Gulch, Culvert beneath Paul Sweet Road, located at 1.5 mi. marker.

Jurisdiction: County of Santa Cruz

Ownership: Public right-of-way, County Rd. **APN:** Not Applicable

Problem: Existing culvert has down cut roughly 6 feet, resulting in accelerated erosion of banks downstream of culvert and impedes fish passage at all flows. Local observers report repeated blockages of culvert by woody debris. Blockage of culverts causes flooding of Paul Sweet Road.

Proposal: Several proposals have been offered, including removal of the culvert and replacement with a bridge structure with capacity to convey a 100-year flood. Less expensive would be to construct step pools immediately downstream aiding in elevating the channel bed and moderating the slope at this point. Downstream banks require stabilization by sloping and re-vegetating with endemic native plants.

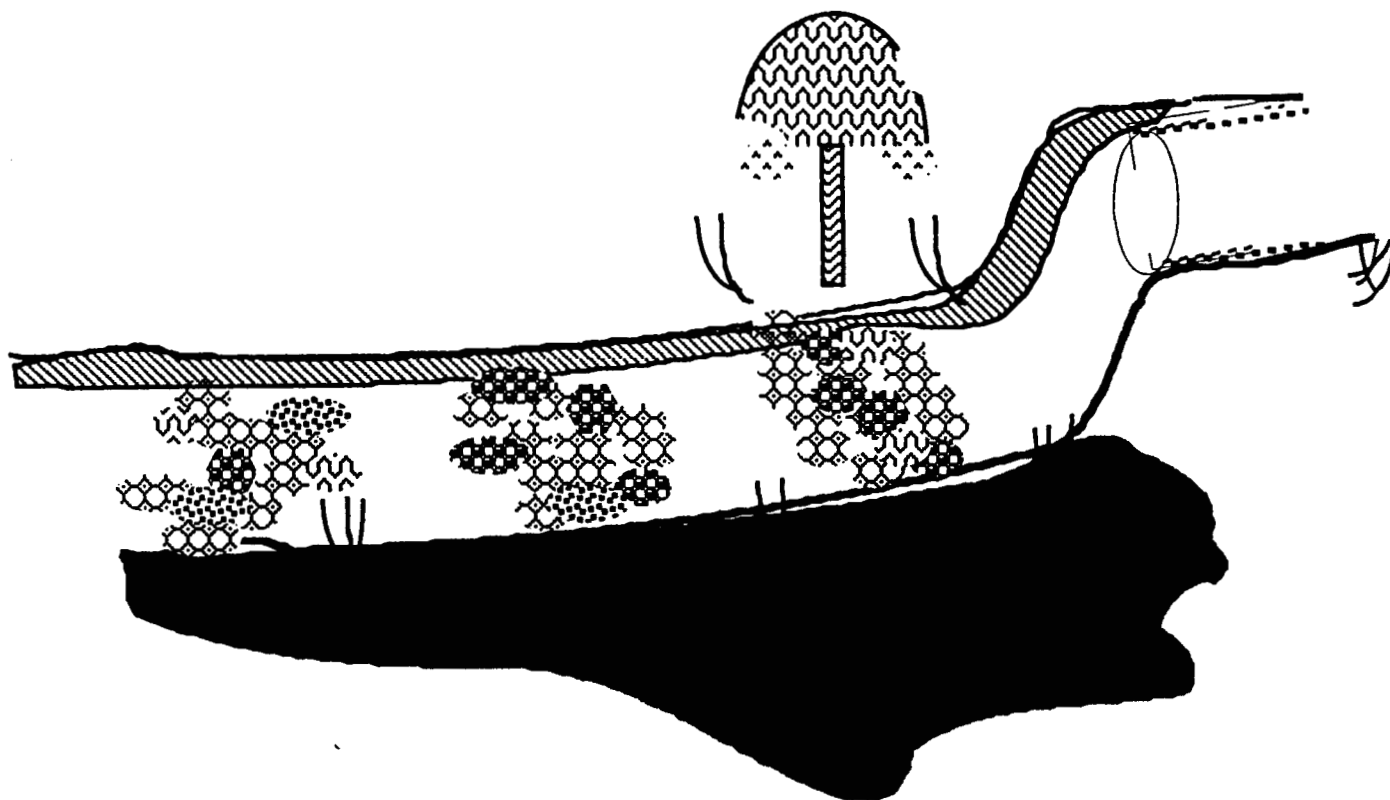
Site 7 is characterized as a fish barrier at most flows, the responsible factor in downstream bank destabilization and as increasing flooding hazard for upstream homeowners. Due to these compounding issues, a simple, inexpensive repair would not be effective and would likely solve only one of the problems. Therefore, it is highly recommended that the existing bridge and culvert be removed and replaced with a new bridge that can properly and safely convey the estimated 100-year flood for Arana Gulch. In conjunction with replacing the bridge and culvert, the western banks immediately downstream of the existing bridge may need to be stabilized in a manner similar to that for Site 2. Additionally, the streambed downstream of the bridge may need to be stabilized with a step-pool reach built with boulder sized material. To ensure compatibility and functionality, conceptualization of new bridge plans should include consultation by a qualified fisheries biologist and geomorphologist. Cooperation from and approval by upper watershed residents will be key for implementation of these recommendations.

Purpose: Allow for fish passage to upstream reaches on the eastern branch of Arana Gulch, reduce local flooding potential and stabilize downstream banks.

Construction Methods: This area is a collection point for multiple sources of water including two roads, possible sheeting from upstream slopes, and the constriction created by the culverts. A comprehensive study is required to determine the best approach to allowing fish passage and simultaneously allow for vehicular traffic.

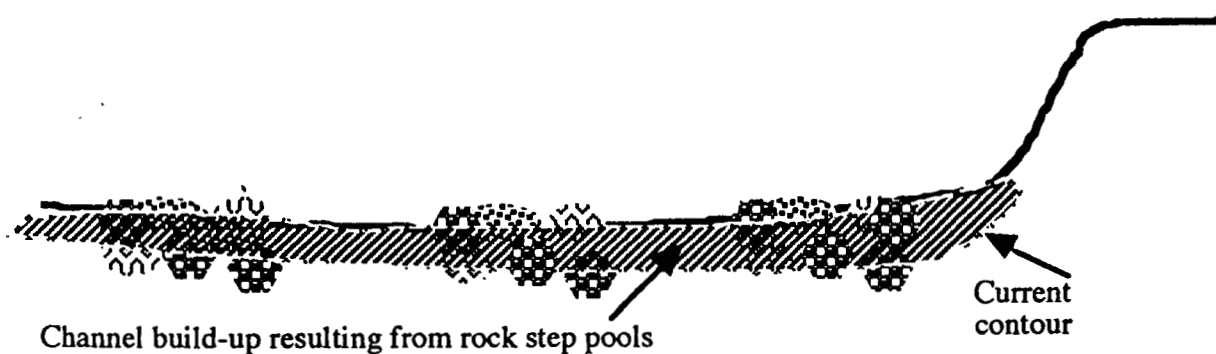
Potential Impacts: To be determined at a later date when project proposal is finalized and site plans are developed.

Figure 7.6 Site 7: Main Branch Culvert Beneath Paul Sweet Road - one repair approach



Remove culvert and replace with bridge structure. Install a series of step pools immediately downstream from removed culvert

Scale: 1" = 10'-0"



July 1, 2001
Toni Danzig Restoration Ecologist



Site 7: Culvert Under Paul Sweet Road

SITE 8 – STEELHEAD MIGRATIONAL BARRIER (B9)

Location: Central Branch of Arana Gulch, located 0.39 miles upstream of the confluence with the eastern branch along side Maybee Lane.

Jurisdiction: County of Santa Cruz

Ownership: Private **APN:** 102-111-03

Problem: Series of 3 woody debris jams that likely make fish passage impassable.

Proposal: Hand removal of logjams. For Sites 8, 9 and 10, approaches similar to those discussed for Sites 4, 5 and 6 are proposed. As with the above sites, the goal for these sites is to restore passage for migrating steelhead. Removal of the instream barriers with chain saws and other simple tools is recommended, as is field guidance from a fisheries biologist. Attention should be given to disposal of material removed from the channel. If material is left in the watershed, it should be moved up to several hundred feet from the channel and situated to minimize future movement.

Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks.

Construction Methods: Will require assessment of fisheries biologist to recommend material removal and structural alteration by hand crew. Materials providing habitat should remain. Any materials slated for disposal should be removed from site or removed out of bank-full reach.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.

SITE 9 – STEELHEAD MIGRATIONAL BARRIER (B8)

Location: Central Branch of Arana Gulch, 0.37 miles upstream of the confluence with the eastern branch, located adjacent to Maybee Lane.

Jurisdiction: County of Santa Cruz

Ownership: Private **APN:** 102-111-03

Problem: Six-foot high logjam that likely creates impassable conditions for fish.

Proposal: Hand removal of log jams. For Sites 8, 9 and 10, approaches similar to those discussed for Sites 4, 5 and 6 above are proposed. As with the above sites, the goal for these sites is to restore passage for migrating steelhead. Removal of the instream barriers with chain saws and other simple tools is recommended, as is field guidance from a fisheries biologist. Attention should be given to disposal of material removed from the channel. If material is left in the watershed, it should be moved up to several hundred feet from the channel and situated to minimize future movement.

Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks.

Construction Methods: Will require assessment of fisheries biologist to recommend material removal and structural alteration. Materials providing habitat should remain. Any materials slated for disposal should be removed from site or removed out of bank-full reach.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.



SITE 10 – STEELHEAD MIGRATIONAL BARRIER (B7)

Location: Central Branch of Arana Gulch, 0.27 miles upstream of the confluence with the eastern branch, located adjacent to Maybee Lane.

Jurisdiction: County of Santa Cruz

Ownership: Private

APN: 102 111 03

Problem: Riprap piled instream has created a partial dam and destabilized banks by forcing flow around the riprap into the banks causing bank undercutting.

Proposal: Hand removal of riprap, estimated at approximately 2 cubic yards. For Sites 8, 9 and 10, we propose approaches similar to those discussed for Sites 4, 5 and 6 above. As with the above sites, the goal for these sites is to restore passage for migrating steelhead. Removal of the instream barriers with chain saws and other simple tools is recommended, as is field guidance from a fisheries biologist. Attention should be given to disposal of material removed from the channel. If material is left in the watershed, it should be moved up to several hundred feet from the channel and situated to minimize future movement.

Purpose: Allow for fish passage to upstream reaches on the central branch of Arana Gulch and stabilize downstream banks.

Construction Methods: Hand removal under supervision of fisheries biologist, disposal of riprap at the discretion of resident and biologist.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Removal of logs in creek and placement away from channel should also be done with recommendation of biologist for best placement to enhance habitat value without impacting existing vegetation.

SITE 11 – MAYBEE LANE REBEDDING

Location: Central Branch of Arana Gulch, ~0.05 miles upstream of the confluence with the eastern branch to mile 0.5, Maybee Lane.

Jurisdiction: County of Santa Cruz

Ownership: Private

APN: 102-111-03

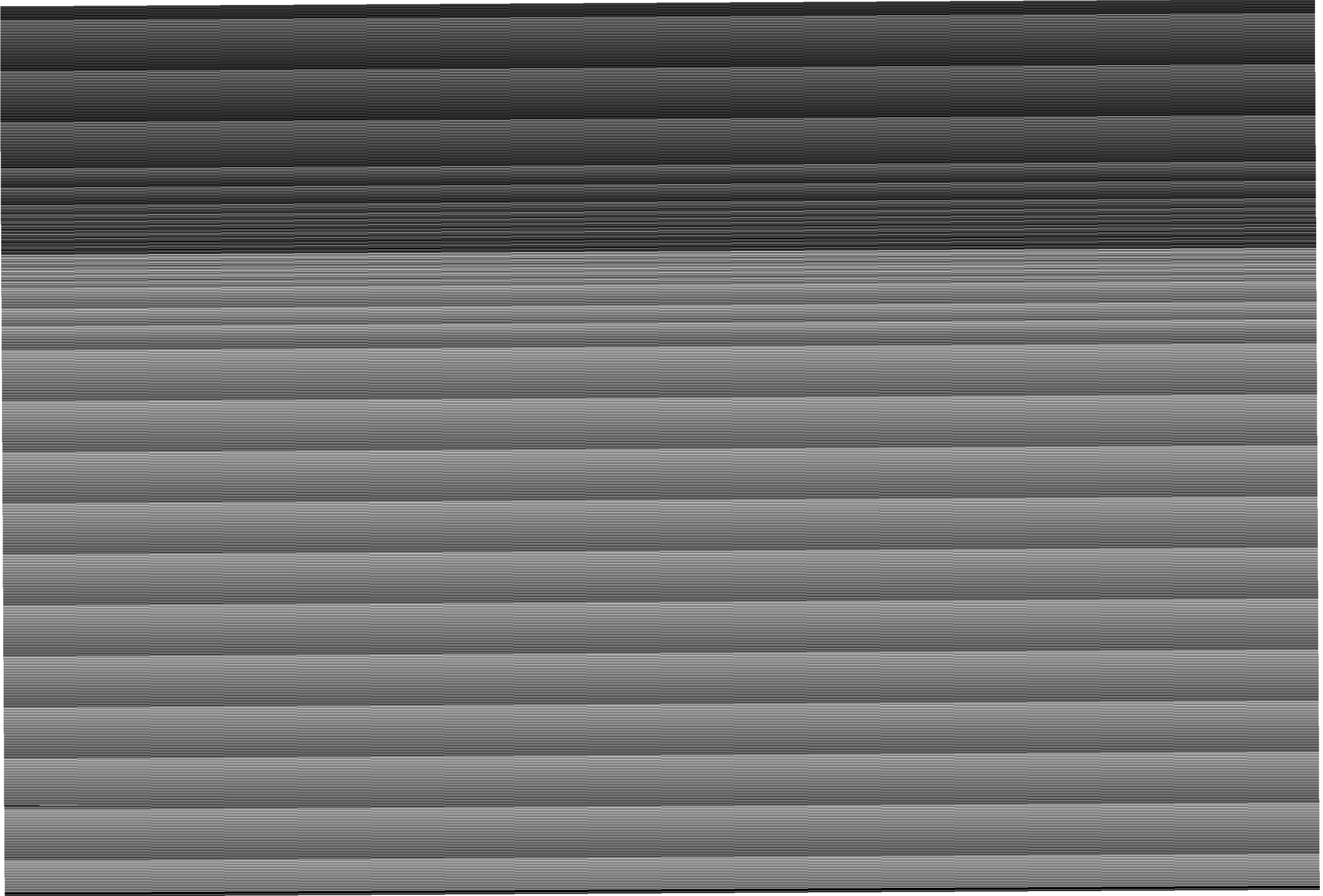
Problem: Segment of old road roughly one-quarter mile long is showing signs of gullying and concentrating runoff from the drainages above. Concentrated runoff is leading to bank destabilization along the central branch upstream of the Bone residence.

Proposal: Rebedding of Maybee Land from roughly 0.05 miles upstream of the confluence with the eastern branch to mile 0.5. Along ~600' X 10' by removing old roadbed, restoring original cross slope, repair gullies and restore vegetation where needed with appropriate material. Stabilization of Maybee Lane would include repairing minor gullies in a manner similar to that proposed for Site 3, followed by restoration of the cross-slope grade with non-engineered fill and planting with fast growing native plant species. The approach for this site is intended to restore pre-road conditions and promote natural drainage of the hillslope through streamside soil and vegetation buffers.

Purpose: Would avoid massive bank destabilization and increased localized flooding potential along the central branch of Arana Gulch.

Construction Methods: Recontour original slope, addition of fill may be needed to restore cross slope to old road bed, approximately 600' feet. Construction plans require the cooperation of landowner engineered design and county riparian permitting process.

Potential Impacts: Potential erosion control measures required during grading; engineered plans required; potential vegetation removal.



SITE 12 – STEELHEAD MIGRATIONAL BARRIER (B6)

Location: Central Branch of Arana Gulch, located adjacent to 4050 Paul Sweet Road, ~112 feet upstream of the confluence with the eastern branch.

Jurisdiction: County of Santa Cruz

Ownership: Private

APN: 102-111-03

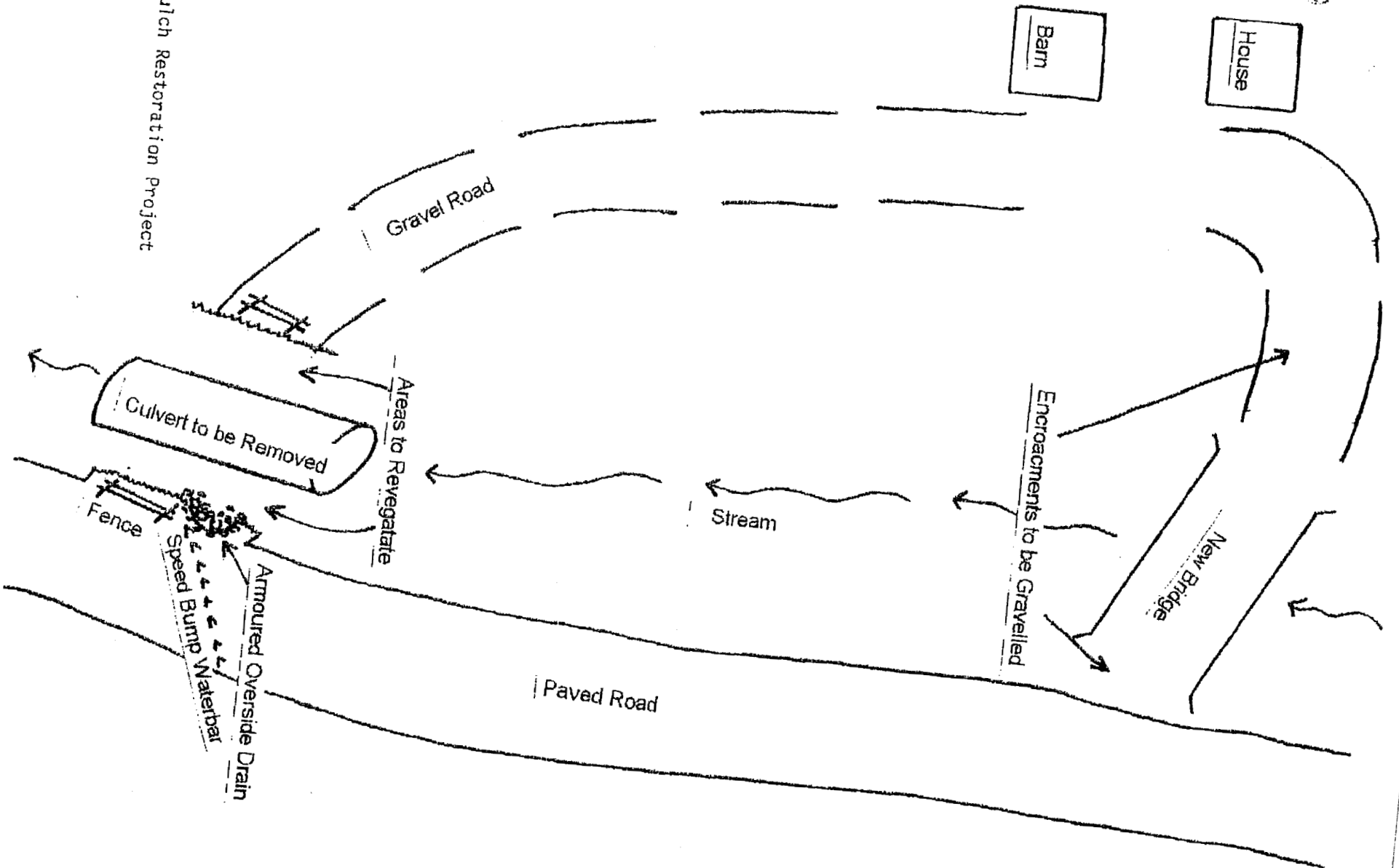
Problem: Perched driveway culvert is likely impassable under most flow conditions and contributes to downstream bank destabilization.

Proposal: Remove culvert and construct new private access flatcar bridge crossing. The culvert removal portion of the project has received CDFG approval of a Streambed Alteration Agreement (notification #: R3-2001) and funding (\$15,536, Jan. 23, 2001). Engineered plans are being prepared and a permit application has been submitted to Santa Cruz County for construction of a new bridge.

Purpose: Allow for fish passage to the upstream reaches on the central branch and stabilize downstream banks and assures resident access to home without threat of culvert blowout.

Construction Methods: The channel bed downstream of the existing culvert should be stabilized so that head cutting does not occur at the existing location with measures similar to that for Site 7 above. Checkdams sized and spaced for a stable step-pool morphology could be built in the bed downstream of the existing culvert. This would stabilize the bed and incrementally step the bed up in elevation to the current elevation of the culvert base. The step-pool design should be constructed with oversight from a fisheries biologist who has experience with fish passage of weir type structures.

Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts.



Arana Gulch Restoration Project



Site 12 – Culvert and Existing Road Replacement



Site 12 – New Bridge Crossing Site Through Trees

DEPARTMENT OF FISH AND GAME

CENTRAL COAST REGION

(707) 944-5520

Mailing address:

POST OFFICE BOX 47

YOUNTVILLE CALIFORNIA 94599

Street address:

7329 SILVERADO TRAIL

NAPA CALIFORNIA 94558



Notification Number: R3-2001-_____

Roberta J. Haver
Arana Gulch Watershed Alliance
903 Pacific Avenue, Ste. 207C
Santa Cruz, CA 95060

PROJECT DESCRIPTION and PROJECT CONDITIONS**Description**

This project is funded by DFG's Fisheries Restoration Grants Program.

The project site is located at 4050 Paul Sweet Road on Arana Creek in Santa Cruz County. At this reach, the creek is approximately 6 feet wide. Steelhead trout are known to be present in Arana Creek.

This project will:

1. Remove a 15 foot long, 48-inch culvert and any associated fill material.
2. Grade banks at the removal site referenced above to a slope of 1:1.
3. Install concrete footings (above bank-full) for a bridge crossing approximately 400 feet upstream from culvert.
4. Place preconstructed, free-spanning bridge on footings.
5. Apply gravel to bridge approaches.
6. Apply erosion control to disturbed areas.

Conditions

The operator shall use a biologist, who possesses the necessary State and Federal permits, to electroshock all fish from the work site prior to dewatering. Rescued fish shall be moved to the nearest appropriate site upstream. A record shall be maintained of all fish rescued and moved, and the record shall be provided to the Department (c/o 1600 program, Post Office Box 47, Yountville, California 94599) with appropriate Streambed Alteration Notification number.

Within 24 hours prior to start of the work, the project site shall be surveyed for CRLF by a qualified biologist. If any CRLF are found work shall not start until the U.S. Fish and Wildlife

Service has been contacted and has given their approval for work to continue. If any CRLF are found during construction, the Department of Fish and Game shall be contacted within two hours.

Work within the stream/riparian corridor shall be confined to the period August 1 to October 31. Revegetation work is not confined to this time period.

No heavy equipment shall operate in the live stream.

The entire stream flow shall be diverted around the work area during excavation and/or construction operations. Sufficient water shall at all times be allowed to pass downstream to maintain aquatic life.

Any temporary dam or other artificial obstruction shall only be built from materials such as clean river gravel or sandbags filled with clean river gravel which will cause little or no siltation.

Adequate erosion and siltation control measures shall be used to prevent turbid or silt-laden water from entering the stream. All erosion controls shall be in place prior to commencement of work and shall be maintained for the duration of the project.

No vegetation with a diameter at breast height (DBH) in excess of four inches shall be removed or damaged.

Disturbance or removal of vegetation shall not exceed the minimum necessary to gain access to the stream. Vegetation shall be pruned using saws or other hand tools. No bulldozer/backhoe type equipment shall be used to remove vegetation. The root zone of the existing vegetation shall not be disturbed.

The perimeter of the work site shall be adequately flagged to prevent damage to adjacent riparian habitat.

If the Operator finds more time is needed to complete the authorized activity, the work period may be extended on a day-to-day basis by the local Department of Fish and Game representative who reviewed the project.

If the Operator would like to renew the agreement beyond the expiration date, a written request for a renewal must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599) for consideration at least 30 days before the agreement expiration date. A renewal constitutes an amendment to the original agreement and requires a fee of \$127.25. Renewals of the original agreement are issued at the discretion of the Department.

If the Operator would like to modify the project, a written request for an amendment must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599). The fee for an amendment fee is half ($\frac{1}{2}$) the original fee. Amendments to the original agreement

are issued at the discretion of the Department.

The Operator shall notify the Department before any modifications are made in the project plans submitted to the Department. Project modifications may require an amendment or a new notification.

This agreement is transferable to subsequent owners of the project property by requesting an amendment.

A copy of this agreement must be provided to the Contractor and all subcontractors who work within the stream zone and must be in their possession at the work site.

Building materials and/or construction equipment shall not be stockpiled or stored where they could be washed into the water or where they will cover aquatic or riparian vegetation.

Debris, soil, silt, bark, rubbish, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. Any of these materials, placed within or where they may enter a stream or lake, by Operator or any party working under contract, or with the permission of the Operator, shall be removed immediately.

During construction, the contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site.

If, in the opinion of the Department, conditions arise, or change, in such a manner as to be considered deleterious to the stream or wildlife, operations shall cease until corrective measures approved by the Department are taken.

Department personnel or its agents may inspect the work site at any time.

YOUR SIGNATURE BELOW DOES NOT ALONE CONSTITUTE A COMPLETED STREAMBED ALTERATION AGREEMENT. Please note that you may not proceed with your project until after your proposed project has been reviewed under CEQA and the Department signs the Agreement.

I, the undersigned, state that the above is the final description of the project I am submitting to the Department for CEQA review, leading to an Agreement. I understand that I will implement the above project conditions required by the Department as part of my project. I understand that I will not proceed with this project until the Department signs the Agreement. I also understand that the CEQA review may result in the addition of

Santa Cruz County Riparian Exception Application
ARANA CREEK PERCHED CULVERT FISH BARRIE REMOVAL

Assessor's Parcel # 102-111-03 (see parcel map)

Contact Persons: Matt Horowitz, Director Natural Resources and Employment
Program (NREP) 457-1741 ext 200

Roberta Haver, AGWA Coordinator 457-8132

Steven Butler, Erosion Control Specialist 335-0249

Plot plan (see parcel map and graphic design attachments)

Directions to the property

The project is located in the Arana Gulch Watershed in Santa Cruz County at the residence of Lance Bone 4050 Paul Sweet Road, on the seasonal/intermittent middle fork of Arana Creek 112 feet upstream of its confluence with the perennial mainstem. One of the two project sites is at a private driveway, 0.8 miles from the intersection of Soquel Avenue and Highway 1 (Section 5, Township T.11s, Range 1W, USGS maps Laurel and Soquel). The GPS coordinates are N36 59.988'; W121 59.196'. The second site is approximately 400 feet upstream of the first site. See attached topo maps and County Assessor's map.

Vicinity Sketch showing the property in relation to surrounding major roads. (see Vicinity Sketch).

Grading Permit - less than 100 cubic yards of dirt being moved around.

Project Description

The project will involve removal of an existing 15'-by-48" corrugated metal pipe (a culvert), removal of fill associated with the culvert (less than ~10 cubic yards), and installation of a flatcar bridge at the second site. The culvert and all fill material at the culvert site will be removed. The banks disturbed by removal of the culvert will be graded to a 1:1 slope. Spoils will be spread outside the floodplain and seeded with grass or mulched. Straw and sandbags will be used to reduce soil disturbance and sedimentation of the stream. Concrete footings for the flatcar will be installed outside of the channel. The bridge will be assembled and then installed onto the concrete footings. Gravel will be applied to both bridge approaches. Erosion-control measures will be applied to the disturbed banks and other soil, including minor re-vegetation with native willow and understory plants.

Any fueling and lubricating of equipment will not be conducted within 20 meters of the riparian zone or water body. Vehicles and heavy equipment will not be driven or equipment operated in the wet or dry portions of a stream or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed. An oil/toxic materials spill contingency plan will be prepared and shall identify the location of containment and abatement materials on site and the notification and cleanup procedures to be followed by the operator in the event of a spill. Any equipment operated within or adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life, wildlife, or riparian habitat.

This project is funded in large part by the California Department of Fish and Game through the Fishery Restoration Grants Program.

California Department of Fish and Game Associate Fisheries Biologist Jennifer Nelson will (1) survey the work two weeks before the onset of activities and will contact the US Fish and Wildlife Service if red-legged frogs (any life stage) are discovered, (2) train project workers to identify red-legged frogs and their habitat, (3) discuss with project workers the importance of red-legged frogs and their habitat, measures being implemented to protect red-legged frogs and their habitat, and boundaries within which the project may be accomplished, and (4) be present at the work site until all red-legged frogs have been removed from the work site and habitat disturbance has been completed.

In-stream flow during the project will be less than approximately 0.05 CFS and fish passage will not be adversely affected during the ½ day any flow will be diverted. Any flow will be diverted via small pump/garden hose assembly from a small bucket set into a small pool upstream of the first site. The pump intake will be screened with a wire mesh not larger than 5 millimeters to prevent fish and frogs from entering the pump system. If a dam is necessary, it will be constructed with no more than a cubic yard of clean gravel. Water management at the second site is not necessary, because bridge footings are not in the channel.

Jennifer Nelson will remove any fish (including steelhead trout) from the project reach using standard electrofishing methods and release them into under-seeded steelhead habitat in the middle fork of Arana Creek.

Reason for requesting riparian exemption

This is an enhancement restoration project benefiting migrating steelhead. It is the first action project being implemented from the Arana Gulch Enhancement Plan draft. This project is a demonstration project to show the local community the benefit of an organized watershed group. It is crucially important that this project be viewed by the community as successful, an example, of how improving wildlife habitat, protecting personal property and contributing to the protection of water quality in Arana can benefit all concerned.

The existing culvert is perched ~ 3 feet above the streambed. It is an outright barrier to upstream movement of steelhead juveniles (and resident rainbow trout) and is a barrier to the spawning migration of many adult steelhead. This project will completely eliminate (anthropogenic) adult and juvenile steelhead passage problems at the site, thus post-project monitoring of fish passage will not be necessary.

The culvert is undersized and diverts flow some seasons, thus causing sedimentation of the stream. The culvert is also at substantial risk of failure. If the culvert fails, the channel will incise and bank stability will be reduced. The project will eliminate overflow and erosion associated with the culvert, improving and protecting water quality for fish and wildlife. Erosion control and bank stability associated with the project will be monitored for ten years by AGWA staff.

Steps of project construction:

Task I. Install flatcar bridge

- Materials purchased and delivered to bridge site (see material list)
- Clear brush in area of bridge placement
- Install erosion control measures (straw bales placed along stream edge)
- Outside of the streambed, excavate site for concrete footings installation, no instream work
- Flat car bridge placed on footings and anchored in place
- Grade, fill and compact driveway access to bridge

Task II. Remove culvert

- Install hay bays at stream edge for control of sediment
- Use backhoe to dig around existing culvert
- Pluck out culvert and smooth back banks on each side of stream

Task III. Revegetate

- Both sites will be covered with erosion control material.
- Replant with native riparian grass and plants (willow, alder, herbaceous perennials i.e., Hedge Nettle, California Bee Plant, Sword Fern, rushes) will be planted by AGWA volunteers.
- Plants purchased or transplanted from native plants within one-quarter mile of the target site.
- Mulch and fertilizer applied to new plantings.

Plot Map attached

Plot plan shows distance to the watercourse, all proposed development, details of erosion control and the extent of areas to be revegetated.

No significant tree removal is necessary for this project.

CA Fish and Game is lead agency writing a categorical exemption for 1600 stream alteration permit. Marty Gingras is contact person for Fish and Game.

SCHEDULE

Work will be accomplished during late summer low-flow periods when there will be minimal effects on developing juvenile steelhead. Pre-construction will begin as soon as permits are in place. Project is to be completed by the last week in October 2001 or between June – October 2002.

<u>September</u>	Supplies delivered, construction begins,
<u>October</u>	Bridge completed, culvert removed, revegetation installed, monitoring begins.

Materials List

Flat car bridge ~30'
6 concrete blocks for footings (3 on each side)
transfer load of drain rock for encroachments
1-2 truck loads of gabion rock for oversize drain and other armoring
24 sand bags, 24 straw bales, 2 lbs native grass seed, 50' revegetation cloth, shovels, native plants (some purchased others gathered on location), pump/garden hose assembly bucket, wire mesh to screen intake.

Completed project

Project site to be inspected by Fish and Game, other appropriate stakeholders.

Monitoring

Erosion and bank stability associated with the project should be improved by the project and will be monitored for ten years by AGWA staff and Fish and Game. If accelerated bank erosion attributable to the project is detected, it will be mitigated for using bioengineering techniques referenced in the ACOE bioengineering manual (or similar).

SITE 13 – PILKINGTON ROAD DRAINAGE

Location: Drainage located north of the West Branch of Arana Gulch, located north of Delaveaga Park adjacent to Pilkington Road, 3300 Stable Lane

Jurisdiction: County of Santa Cruz

Ownership: Private

APN: 102 052 29

Problem: Concentrated runoff from hillslope above Pilkington Road is causing increased gullying in slope adjacent to existing landslide at head of west branch. Personal interview with landowner explains after years of dumping brush on the slope which prevented plant growth, coupled with runoff from driveway across the street resulted in the landslide. Landslide occurred during a winter storm of 2000. Road Association installed retaining wall and revegetated in fall 2000.

Sites 13, 14, 15 and 16 are sources of sediment from hillslope instability in the western branch. Site 13 is located on Pilkington Drive immediately east of the large landslide near the entrance to the equestrian center. The current, rough dimensions of the gully are five feet in width, five feet in depth and ten to fifteen feet in length. This gully receives concentrated storm water runoff from residential parcels above (north of) Pilkington Road through a small culvert that emerges east of the large landslide. Without repair, growth of the gully will compromise the stability of the eastern hillslope above the West Branch and below the equestrian center.

Proposal: Enhance projects constructed by Road Association. Stabilize banks near culvert outlet and general drainage repairs. A series of coir seeded water bars will be installed at upstream and downstream locations as shown on the attached plan, with placement of boulders as energy dissipators. Drainage repairs include removal of existing culvert beneath Pilkington Road and installation of new, increased capacity culvert. Downslope culvert would be lengthened to extend to dissipators. Revegetate entire site as needed with endemic native plantings.

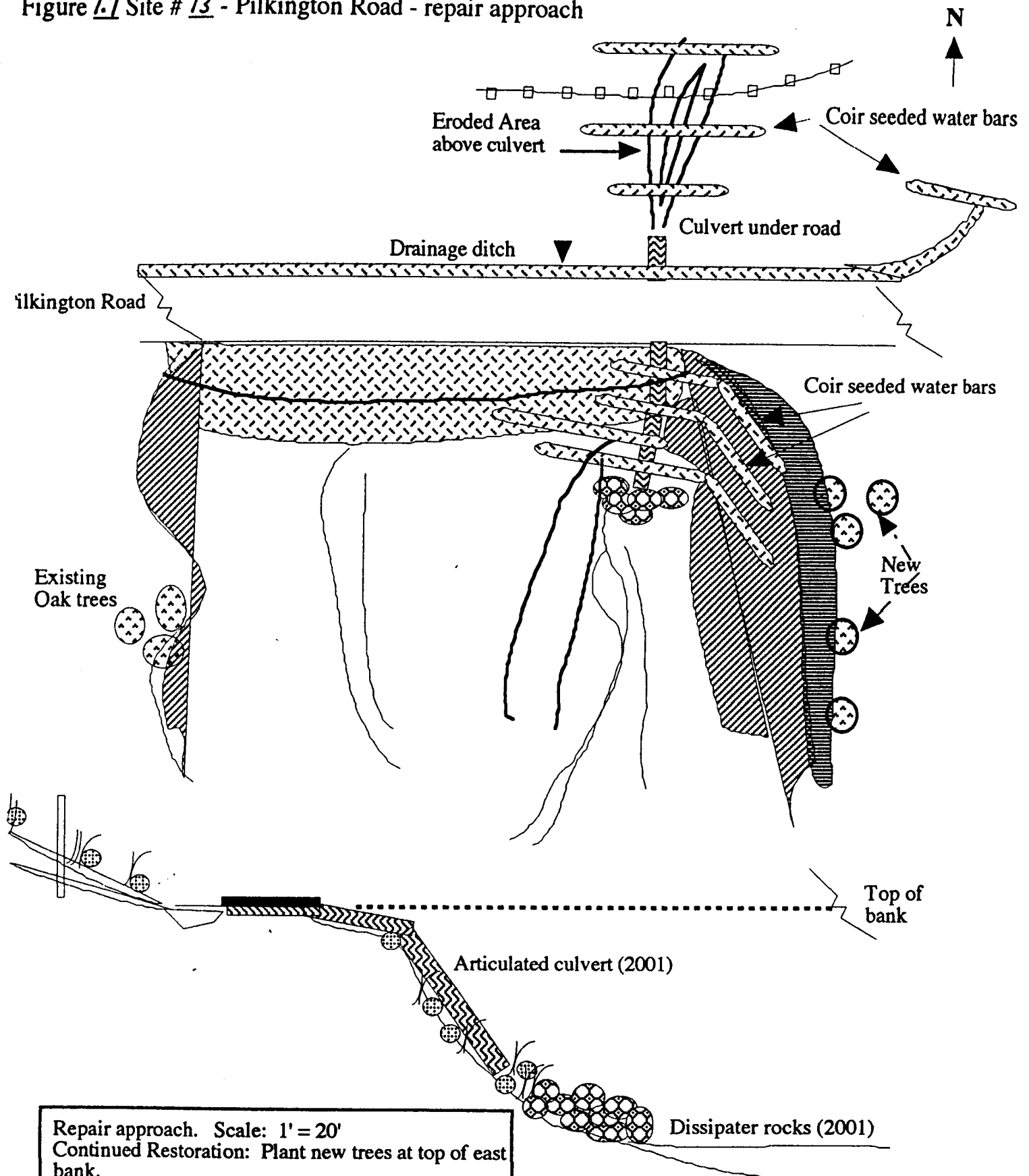
Stabilization of the Pilkington Road drainage will require cooperation from existing landowners and possibly the Santa Cruz County Public Works Department. Repair and stabilization of the culvert outlet will not solve the problem. It is likely that stabilization of the hillslope below the culvert outlet will require efforts upslope to address drainage characteristics of all contributing properties coupled with installation of a new, more effective culvert outlet. Installation of a new culvert outlet will likely include removal of the existing culvert beneath Pilkington Road. Removal of existing culvert will require approval from and coordination with landowners due to the lack of alternate routes to town.

Purpose: Reduce potential for massive erosion landsliding on the eastern hillslope and direct input of large volumes of sediment to the system. Protect property owners near the site (equestrian cent) and downstream. It is in the Purisima Formation prone to gullying. Site necessitates protection against further erosion.

Construction Methods: Prior to installation, a field assessment of current conditions would be required to determine quantity of materials needed. Coir seeded water bars would be installed using 12" staples. Installation would be contoured to divert flow toward gentler slopes to spread energy more evenly over area. Other materials such as erosion mat may be used to reduce any concentrated flow potential. This site is easily accessed via Pilkington Road. Timing of repairs will need to be coordinated with residents to avoid road blockage during key times of the day.

Potential Impacts: Potential removal of small amounts of riparian vegetation; erosion control measures may be required on steeper slopes.

Figure 7.7 Site # 13 - Pilkington Road - repair approach



Repair approach. Scale: 1' = 20'
 Continued Restoration: Plant new trees at top of east bank.
 Install coir rolls around culvert area and to extent possible on east bank. Re-seed terraces and both banks with deep rooted native grasses.

Toni Danzig, Restoration Ecologist
 Oct. 2, 2001



**Site 13 – Culvert
underneath Pilkington
Road**

SITE 14 – DELAVEAGA DISC GOLF COURSE SITE

Location: Located on east side of DeLaveaga Park, west of the West Branch of Arana Gulch

Jurisdiction: City of Santa Cruz

Ownership: Public (City*)

APN: 009 461 02

***Note:** City is transferring land ownership of the area in which the Disc Golf Course currently exists to the State of California.

Problem: Disc Golf Course has general wide-spectrum erosion. Of specific concern due to their location and contribution of sediment into the Arana Gulch system are holes 1–5, 25 and 27. These holes have large amounts of bare, un-vegetated soils available for transport. Concentrated runoff through the area has resulted in accelerated downstream erosion in the gully that follows holes 20 and 21 and drains into the West Branch of Arana Gulch.

Sites 13, 14, 15 and 16 are sources of sediment from hillslope instability in the western branch. Site 14 is roughly one acre in size and consists of holes one through five and hole twenty-seven of the De Laveaga Disc Golf Club. These holes are located to the west of the golf club parking lot and contribute surface runoff to a culvert found near the green for hole nineteen and the tee for hole twenty. This area has lost most of its natural topsoil and vegetative cover.

Proposal: Moderate re-grading, major re-soiling and revegetation (importing approximately 12,000-19,000 cubic yards of topsoil covering an area of approximately 1 acre) bringing eroded areas back up to grade. De Laveaga Disc Golf Course-area across from parking lot. Repair of this area, roughly 1 acre in size, will require minor grading with 6 or more inches of soil followed with planting of a resilient golf course related grass seed mixture. Depending on depth of the existing soil material (high in clays), grading with topsoil may need to be coupled with tilling of the existing surface up to 10 inches in depth and mixing the graded soil with organic material. If the existing soil surface is not broken down, topsoil that is applied to the area could easily wash away before grasses mature.

Purpose: Restore natural capacity of soils to absorb water thus reducing the volume of runoff during storm events. Restoration of grasses and 'top soil' on these holes will help reduce the rate of growth in the gully draining to the west branch.

Construction Methods: Grading equipment required for grading and tilling the 1-acre identified; first till, then dump topsoil, mix together and plant. Dump trucks using DeLaveaga Park Road will deliver (12,000-19,000 cubic yards) topsoil, enough to cover the 1-acre area to a 9"-14" depth. If the existing soil surface is not broken down, topsoil that is applied to the area could easily wash away before grasses mature. Planting of appropriate ground cover of native species shrubs and grasses suitable for the activity will be installed. Site 14 is easily accessed and there is ample parking for work crews and repair materials. Timing the repair to avoid tournaments and other key scheduled events, dividing the repair program into phases, and allowing for partial or restricted access are some approaches that merit consideration as a part of a cooperative effort. Although part of Delaveaga Park, this area is owned by the National Guard, which might also wish to affirmatively participate in this program.

Potential Impacts: Erosion control measures required during regrading and scheduling controls to avoid peak recreational use periods.





Site 14
Lower portion
of eroded
disc course.



Beginning of gully from runoff
across the road at location from
above photo

SITE 15 – GULLY BELOW DELAVEAGA DISC GOLF COURSE SITE

Location: Located on east side of Delaveaga Park, west of the West Branch of Arana Gulch, 501 DeLaveaga Park Rd.

Jurisdiction: City of Santa Cruz

Ownership: Public (City*)

APN: 009-461-02

***Note:** City is transferring land ownership to the State of California.

Problem: Large Gully below Disc Golf Course, approximately 300 yards long, completely overgrown with poison oak. The highly degraded condition of Disc Golf Course holes 1–5, 25 and 27 has resulted in concentrated runoff through the area and accelerated downstream erosion contributing significant amounts of sediment into the Arana Gulch system.

Sites 13, 14, 15 and 16 are sources of sediment from hillslope instability in the western branch. Site 15 is a gully roughly 1000 feet in length and cross-sectional dimensions of eight feet by eight feet. The Site 15 gully is directly connected to the West Branch. The gully starts below a culvert found in between the green for hole 19 and the tee for hole 20 and receives concentrated storm runoff from Site 8 discussed above. The head of the gully has downcut to bedrock, and is now beginning to widen. The recent, accelerated growth of the gully is closely associated with concentrated storm runoff from Site 14.

Proposal: Closely monitor Site 15 in conjunction with repair to Site 14, which is hypothesized to be the root problem of Site 15. Appropriate monitoring of the gully would include establishment of permanent monitoring locations. At these locations, bi-annual measurement of gully depth and width should be recorded. Appropriate months would include September or October and April or May. From these bi-annual measurements, the volume of sediment lost and the growth rate of the gully could be calculated for each monitoring location. Conditions should be monitored for several years following repairs to Site 14. If the gully continues to grow following this period appropriate steps should be taken to stabilize the gully.

Monitoring Site 15 is proposed in conjunction with repair to Site 14, which is hypothesized to be the root problem of Site 15. Appropriate monitoring of the gully would include establishment of permanent monitoring locations. At these locations, bi-annual measurements of gully depth and width should be recorded. Appropriate months would include September or October and April or May. From these bi-annual measurements, the volume of sediment lost and the growth rate of the gully could be calculated for each monitoring location. Conditions should be monitored for several years following repairs to Site 14. If the gully continues to grow following this period appropriate steps should be taken to stabilize the gully.

Purpose: Reduce volume of sediment input to the west branch and protect the adjacent holes of the disc golf course.

Construction Methods: Methods have not been determined. The head of the gully is easily accessed from Upper Park Drive, while the midstem of the gully would be accessed from holes 20 and 21 and the lower segment of the gully is inaccessible. Access through holes 20 and 21 should be approached with caution, as it is possible that repair activities could aggravate an already degraded system.





**Site 15 Gully, looking
downstream**



**Site 15 gully looking upstream
toward Delaveaga Disc Golf Course**

SITE 16 – GULLY WEST TRIBUTARY AT DELAVEAGA PARK LOWER SERVICE ROAD

Location: Located adjacent to Delaveaga Park service road on east side of Delaveaga Park, 240 Fast Lane, on the West Branch of Arana Gulch

Jurisdiction: City of Santa Cruz

Ownership: Public (City of Santa Cruz)

APN: 009-451-02

Problem: Increased rate of tributary growth due to concentrated runoff resulting in erosion and gully ~40 yards long. Tributary contributes moderate volumes of sediment to west branch.

Sites 13, 14, 15 and 16 are sources of sediment from hillslope instability in the western branch. Site 16 is located below the City maintenance road just upstream of the firing range. It is a gully with rough dimensions of 10 feet in width, 10 feet in depth and 75 feet in length. The likely cause of the gully is concentrated runoff received from roads, parking areas and areas of shallow or absent soils in what is now the disc golf course. Site 16 is directly linked to the west branch of Arana Gulch.

Proposal: Stabilize banks using a step-pool form built from boulder-sized materials and rootwads. Replace culvert with bridge structure. Combine sandbags filled with native soil and large woody debris keyed into bank and to fill deepest cuts. Slope construction downstream. Densely stake willows through sandbags, especially at south side. Care should be used in selecting rock, such that it is sufficiently durable to remain effective, yet also appear to originate in the area.

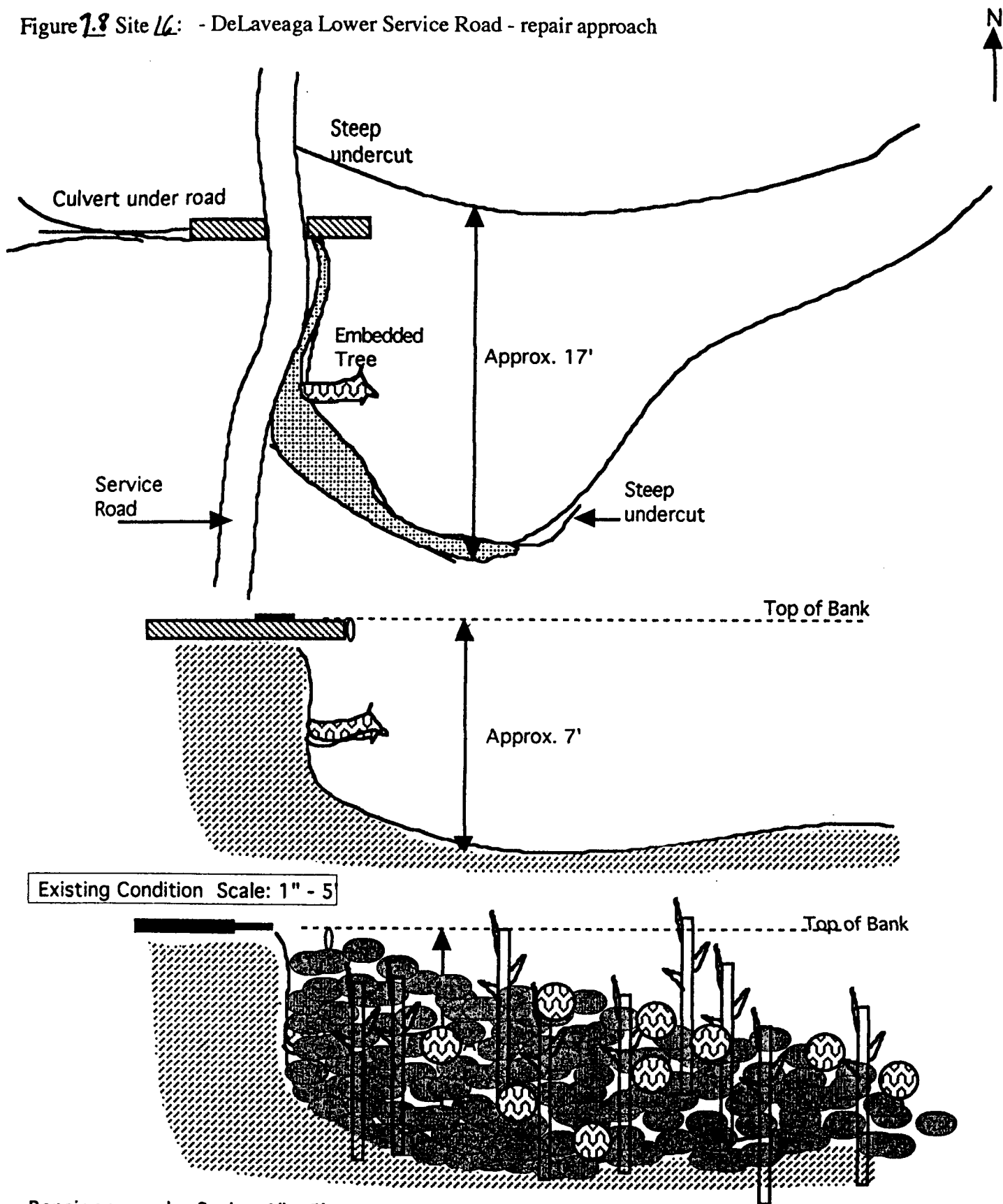
Stabilization of this hillslope gully is recommended in a manner analogous to that discussed for Site 3. The bottom of the gully should be filled with base rock up to several inches thick with perforated piping laid over the gravels and subsequently buried with more coarse gravels. The remaining gully volume should be filled with non-engineered fill and planted with a fast-growing native plant. Drainage configurations in the overlying roads should also be addressed with possible re-directing of runoff to decrease volumes moving through the gully during storm events.

Purpose: Reduce volume of sediment input to west branch, reduce flooding potential for residents of the former Paul Sweet House, protect existing service road.

Construction Methods: Approximately 200 cubic yards of boulder sized materials and rootwads will be imported and placed along both sides of the channel for a distance of approximately 20 feet for stabilization. Native soil and willow stakes will be locally gathered on site. Site 16 is easily accessed via the City's maintenance road with approach from the south being the most direct. Constraints with this site are limited to coordination with the City of Santa Cruz Public Works Department to avoid obstructing this narrow one-way road during repair implementation.

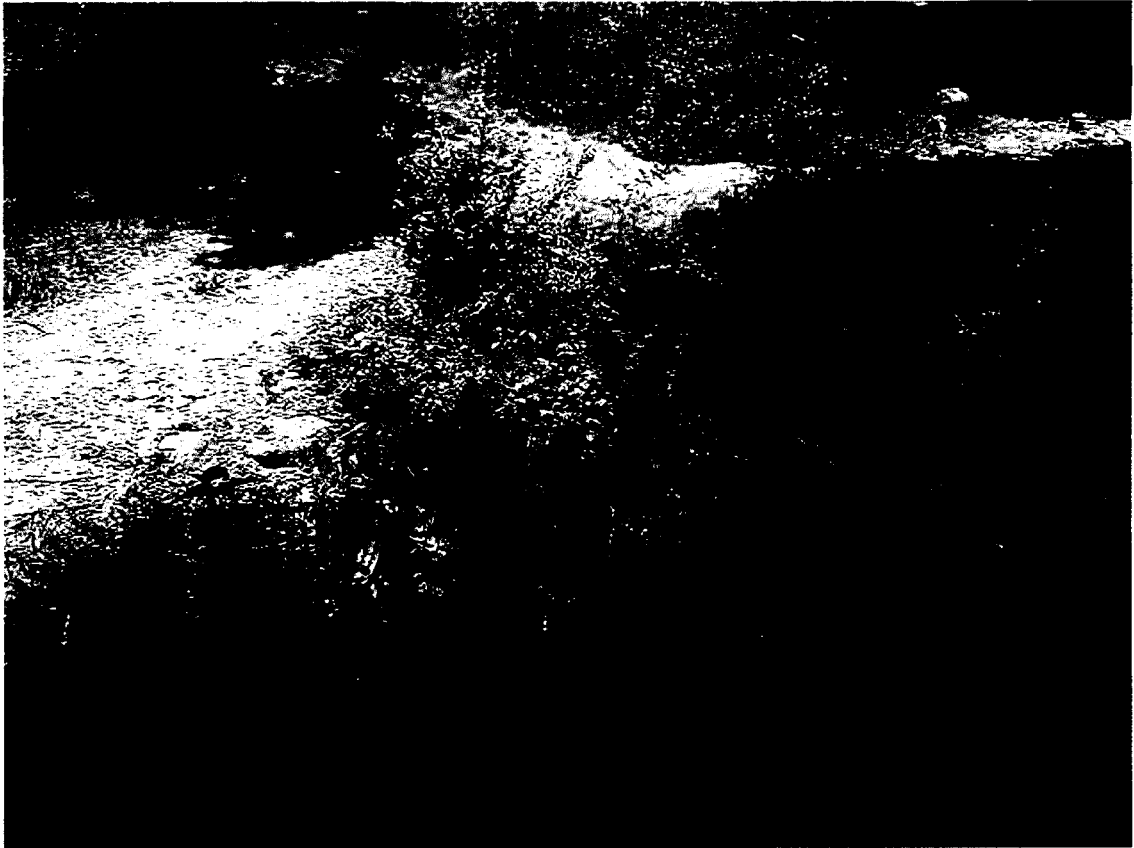
Potential Impacts: Timing and implementation of best management practices required to avoid steelhead migration season and prevent water quality impacts. Placement of rock in channel or channel slopes may impact wetlands and require U.S. Army Corps of Engineers permit.

Figure 1.8 Site 16: - DeLaveaga Lower Service Road - repair approach



Repair approach: Scale: 1" = 5'

Replace culvert with bridge structure. Combine sandbags filled with native soil and large woody debris keyed into bank and to fill deepest cut. Slope construction downstream. Densely stake willows through sandbags, especially at south side.



Site 16

SITE 17 – CAPITOLA ROAD CROSSING

Location: Located on Arana Gulch, adjacent to Capitola Road

Jurisdiction: City of Santa Cruz

Ownership: Vacant City Land

APN: 026 082 01

Problem: Culvert beneath Capitola Road is accelerating bank erosion on the western bank. At some previous time a concrete brick wall was built parallel to Capitola Road, in the creek, approximately 9 feet downstream from the outflow end of the culverts. The wall has had a niche cut in it, which at high flows directs the creek toward the opposite bank. The velocity and volume of water at high flow is undercutting the opposite bank.

Proposal: Monitor site for future incision and bank instability downstream of the existing culver. Site has the potential to become a fish passage barrier, and could limit effectiveness of upstream projects.

Purpose: Further study of this site is recommended prior to making a proposal. Continued monitoring of the culverts is recommended and they should be cleared of debris when necessary.

Construction Methods: None proposed at this time.

Potential Impacts: No specific recommendation proposed at this time.

SITE 18 – GREENBELT GULLY

Location: Located west of Arana Gulch, off of Agnes Street, 101 Mentel Ave.

Jurisdiction: City of Santa Cruz

Ownership: Public (Arana Gulch Greenbelt)

APN: 011 01 12

Problem: Accelerated erosion of hillslope below the corner of Agnes Street and Park Way South due to concentrated and focused runoff has resulted in a gully, which directly delivers sediment into Arana Gulch.

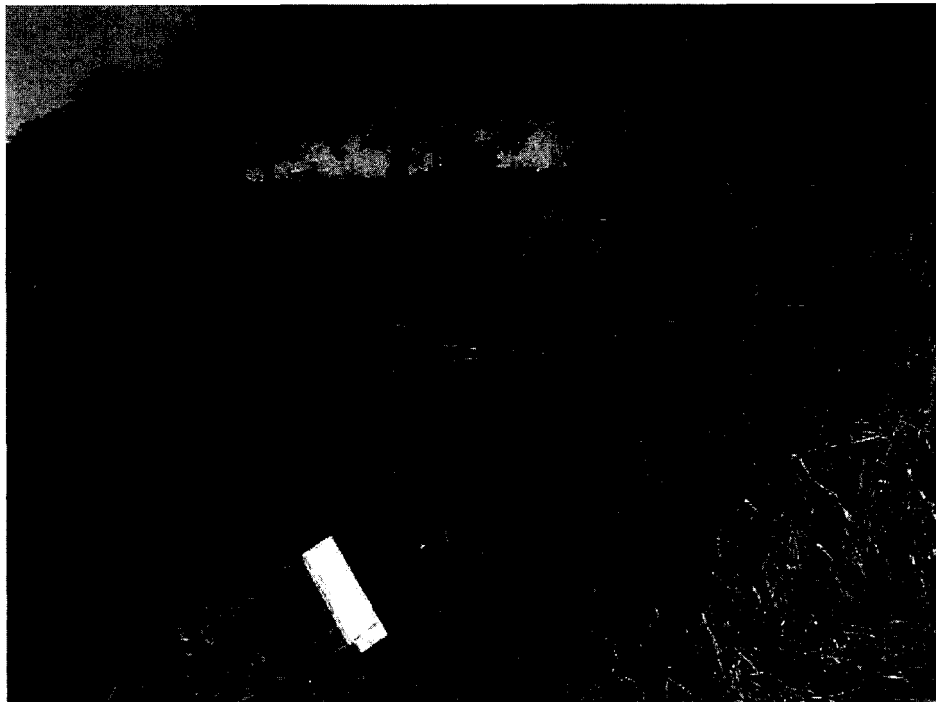
Site 18 is located roughly five hundred feet downstream of the Capitola Road crossing on the western hillslope below the corner of Agnes Street and Park Way South. The rough dimensions of the gully are five feet in width, three feet in depth and one hundred and seventy five feet in length. The gully receives concentrated storm runoff from the development above the hillslope and has cut into younger marine terrace deposits and possibly the A subunit of the Purisima Formation.

Proposal: City of Santa Cruz is consulting erosion control specialist to design remediation of the existing gully and prevention of future gullies in the area of the greenbelt. Solutions will likely involve creation of a stable step pool design.

Purpose: Reduce sand and sediment entering Arana Gulch and North Harbor.

Construction Methods: None proposed at this time.

Potential Impacts: No specific recommendation proposed at this time.



**Greenbelt gully
looking up to
Agnes**

SITE 19 – TIDAL REACH

Location: Located between Brommer St. and Soquel Ave.

Jurisdiction: City of Santa Cruz

Ownership: Public (Arana Gulch Greenbelt) **APN:** 011-101-12

Problem: Accelerated channel headcutting and channel bank failure through the tidal reach has resulted in increased loading of sandy sediment to the Harbor and tidal reach.

Site 19 is a significant source of fine to very fine sand in lower Arana Gulch. Ongoing bank retreat has been characterized as a series of channel bank failures due to elevated sediment pore pressure following high tide (Hecht and others, 1982). Channel bank failure associated with Site 19 results in direct addition of sediment to the channel with correspondingly rapid transport time to the north harbor (1-3 days). They found that sites nearest to the inlet culverts have experienced the largest amounts of bank collapse while the largest percentage of increase in channel width has occurred in the upstream portion of the reach (for the period 1963-1982). Subsequent work conducted by the Coastal Watershed Council in 1999 showed that the channel widening in the tidal reach has continued since 1982, more or less at the same rate although individual sections vary. The Coastal Watershed Council also found that the bed through the tidal reach has aggraded an average of two feet since 1982. Bed aggradation through the tidal reach is likely the result of increased sediment supplied from the upper watershed and increased rates of bank collapse in the tidal reach.

Proposal: Various parties have suggested several conflicting repair recommendations for site 19. For a detailed discussion of several repair options see Hecht and others, 1982 (**Appendix C of Enhancement Plan**). At this point, consensus has not been reached as to a single repair plan amongst the project consultants and the California Department of Fish and Game. If consensus is reached, the solution will be included in a later update of this report.

Purpose: Stabilize tidal reach, decrease sediment loading to the Harbor.

Construction Methods: Not known at this time due to no specific proposals.

Potential Impacts: Not known at this time due to no specific proposals.



**Site 19-Upper Harbor
Culverts**



**Tidal Reach looking upstream
from Culverts under North
Harbor Parking Lot**



**East bank of tidal reach
looking upstream at culverts
and RV lot in North Harbor**

